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THE

NATURAL HISTORY

OF

PLANTS.

VOL. VI.

THE
NATURAL HISTORY
OF
PLANTS.

BY

H. BAILLON,

PRESIDENT OF THE LINNÆAN SOCIETY OF PARIS,
PROFESSOR OF MEDICAL NATURAL HISTORY AND DIRECTOR OF THE BOTANICAL GARDEN
OF THE FACULTY OF MEDICINE OF PARIS.

VOL. VI.

CELASTRACEÆ, RHAMNACEÆ, PENÆACEÆ, THYMELÆACEÆ,
ULMACEÆ, CASTANEACEÆ, COMBRETACEÆ,
RHIZOPHORACEÆ, MYRTACEÆ, HYPERICACEÆ, CLUSIACEÆ,
LYTHRARIACEÆ, ONAGRARIACEÆ, BALANOPHORACEÆ.

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NATURAL HISTORY OF PLANTS.

XLVI. CELASTRACEÆ.

I. EUONYMUS SERIES.

Euonymus[1] (fig. 1–7) has regular, hermaphrodite flowers in four or five parts. In many species the receptacle is somewhat convex or depressed, surmounted by a large and flattened glandular disk. The calyx is short, in four or five imbricated divisions. The petals, alternate and longer, are imbricated in the bud. Alternately are inserted, near the corners of the disk, an equal number of stamens. The filaments are free, generally short, subulate, at first incurved; the anthers are bilocular, and the cells, often didymous, open longitudinally,

Euonymus verrucosus.

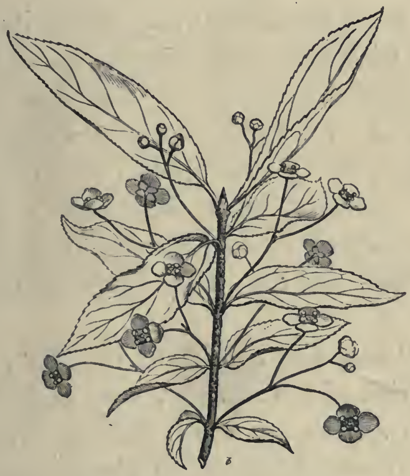

Fig. 1. Floriferous branch.

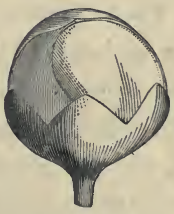

Fig. 2. Bud ($\frac{6}{1}$).

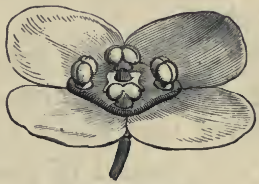

Fig. 3. Flower.

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[1] *Euonymus* T. *Inst.* 617, t. 388.—Adans. *Fam. des. Pl.* ii. 304. — L. *Gen.* n. 271. — *Gen.* 377.—Gærtn. *Fruct.* ii. 149, t. 113.—Lamk. *Dict.* ii. 571; Suppl. ii. 685; *Ill.* t. 131.—DC. *Prodr.* ii. 3.—Turp. in *Dict. Sc. Nat.* Atl. t. 272. —Spach, *Suit. à Buffon*, ii. 404.—Endl. *Gen.* n. 5676.—A. Gray. *Gen. Ill.* t. 171.—B. H. *Gen* 360, 997, n. 1.—H. Bn. in *Payer Fam. Nat.* 323.—Hook. *Fl. Ind.* i. 607.—*Vyenomus* Presl, *Bot. Bem.* 32 (incl. *Glyptopetalum* Thw. *Lophopetalum* Wight, *Melanocarya* Turcz.

inwards, oftener on the margin, or even a little outwards.[1] Between them rise, more or less, the alternate lobes of the disk, in the centre of which, more or less depressed, the gynæcium is inserted. This is composed of an ovary of 3–5 cells, superposed to the petals when equal in number, and surmounted by a longer or shorter style, with 3–5 lobed stigmatiferous extremity. In the common Euonymus (*Euonymus europœus*) and in many other species,[2] the placenta, which is in the internal angle of each cell, supports, at its base, two ascending anatropal ovules, with micropyle directed downwards and outwards.[3] The fruit is a four-angled capsule, depressed at the summit, one or more of the cells of which, dehiscing along their dorsal suture, contain one or more, rarely two, seeds enveloped in a fleshy and coloured aril,[4] and enclosing under their coats a fleshy albumen, the axis of which is occupied by an embryo (often green), with an inferior cylindro-conical radical, and large foliaceous cotyledons.

Euonymus verrucosus.

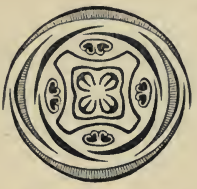

Fig. 4. Diagram.

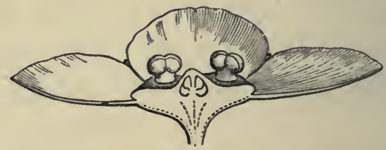

Fig. 5. Longitudinal section of flower.

The form of the floral receptacle, the height of the disk, and, consequently, the point of insertion of the stamens, vary in different species of *Euonymus*. There are species in which the two ovules of each cell, instead of ascending, descend, and then the direction of the micropyle is upwards and inwards[5]; in others, again, the ovules are horizontal, or nearly so.[6] *E. nitidus* and *nanus* have four ascending ovules in each cell, disposed in two vertical series. *E. americanus* and *angustifolius* have from two to five in each series, and they then become horizontal or nearly so, their raphes facing. In one species from Ceylon, which has constituted the genus *Glyptopetalum*,[1] because the base of the four petals presents two more or less decided indentures, there is only one ascending ovule. In an Eastern Asiatic species, *E. alatus*, the ovary becomes more lobed with age; it has formed a genus *Melanocarya* [2]. In another Indian species, with many-ovuled cells, *E. grandiflorus* WALL., the petals are fimbriate and more or less prominently crested; hence, the generic name *Lophopetalum*.[3] But these differences of detail seem to us too unimportant to justify the making of distinct genera, and we shall consider them only as sections of the genus *Euonymus*. Taken thus, it includes about forty-five species,[4] arborescent or frutescent, sometimes scandescent. They inhabit chiefly the temperate regions of Europe, Asia, and North America, and are more rare in the tropical parts and in Oceania. The branches are rounded or oftener tetragonal, leaves opposite, petiolate, entire or serrate, persistent, with two small caducous stipules. The flowers are axillary, in cymes, often compound, generally biparous, often few-flowered and sometimes reduced to a single flower.

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[1] They are extrorse in the young flowers of *E. Europœus*. In *E. lucidus*, it may be said that the younger the anther, the more introrse it is. This can be seen clearly in *E. fimbriatus*, *Lophopetalum*, etc. The pollen is generally "ovoid; three-fold; in water, spherical with three bands and papillæ," H. Mohl. *Ann. Sc. Nat.* ser. 2, iii. 338), the same in *Celastrus*, where it may have "an external finely cellulose membrane."

[2] *E. verrucosus*, *atropurpureus*, etc.

[3] A double coat.

[4] Springing primarily from the micropyle, and may extend more or less round the umbilicus, even to its entire circumference.

[5] *E. japonicus*, *lucidus*, *echinatus*, *latifolius*,

[6] See H. Bn. *Rech. sur les Ovules des* Euonymus *cultivés à Paris* (in *Bull Soc. Bot. de Fr.* v 256, 314).

Euonymus europæus.

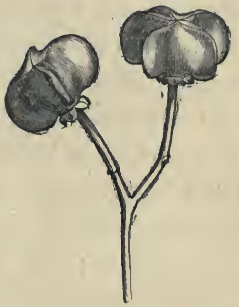

Fig. 6. Fruit.

Euonymus europæus.

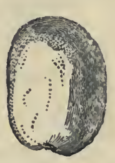

Fig. 7. Seed enveloped in its aril (2/1).

Pachystima, a small shrub of the western mountains of North America, has almost all the characteristics of *Euonymus*: leaves opposite, entire or oftener serrate; flowers 4-merous and 4-androus. But its ovary has only two incomplete and biovulate cells. The ovules are ascending, and the fruit an oblong capsule, dehiscing late. *Catha*

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[1] THW. *Hook. Kew Journ.* viii. 267, t. 7B; *Enum. Pl. Zeyl.* 73.—B. H. *Gen.* 361.—HOOK. *Fl. Ind.* i. 612.

[2] TURCZ. *Bull. Mosc.* (1858), i. 453.

[3] WIGHT, *Ann. Nat. Hist.* iii. 151; *Icon.* t. 162.—ENDL. *Gen.* n. 5675.—B. H. *Gen.* 362. n. 6.

[4] REICHB. *Ic. Fl. Germ.* t. 309, 310.—HOOK, and ARN. *Beech. Voy. Bot.* t. 54.—WIGHT and ARN. *Prodr.* i. 160.—WALL. *Pl. As. Rar.* t. 254.—WIGHT, *Icon.* t. 214, 973, 1053.—MIQ. *Fl. Ind.-Bat.* Suppl. i. 512.—BENN. *Pl. Jav. Rar.* t. 28.—BENTH. *Fl. Hongk.* 62.—F. MUELL. *Fragm.* iv. 118.—A. GRAY, *Man.* ed. 5, 116.—BOISS *Fl. Or.* ii. 8.—GREN. and GODR. *Fl. de Fr.* i. 331.—WALP. *Rep.* i. 530; ii. 827; i. 188 (*Lophopetalum*), 189; vii. 574, 575 (*Glyptopetalum*).

edulis, a shrub of Eastern Africa and Arabia, also has its leaves opposite, the inflorescence, the flower of *Euonymus*; but its ovary, more elongate, and of three biovulate cells, becomes a capsulary fruit, elongate, trigonous, obtuse, its seeds inferiorly dilated into a very thin wing. *Microtropis* is analogous to *Catha* by the elongate form of its capsular fruit. The seed is enclosed in a fleshy and colored envelope which resembles an aril. But the flower is easily distinguished by its concave receptacle, the absence of the disk, the coriaceous sepals and petals; these last united at their base into a hollow gamopetalous corolla. The ovary, inferior at the base, has two or three incomplete cells, in which are two nearly basilar ovules. *Microtropis* is Indian; the leaves opposite and coriaceous very much resembling those of Clusiaceæ, and the corolla, that of the Holly. *Kokoona*, which grows in Borneo and Ceylon, has very nearly the same organs; the hermaphrodite flowers have five thick petals, imbricate or twisted, and a large pentagonal disk having five depressions in which are inserted the same number of stamens. The three cells of their ovary contain each two series of oblique ovules, an indefinite number in each row, and the fruit is a large polyspermous capsule, with imbricate winged seeds destitute of albumen.[1]

Elæodendron forms the chief of a sub-series (*Elæodendreæ*) in which the fruit is indehiscent, instead of capsular. The flowers, moreover, 4–5-merous, are constructed like those of *Euonymus*, and the ovarian cells enclose two ascending ovules. The pericarp is drupaceous, with a uni- or pluri-locular stone, and the seed is exarillate. The *Elæodendrons* are trees and shrubs which grow in all the warm countries of the globe, particularly in the old world. The leaves are often opposite, like those of the *Euonymus;* but they may also be alternate (which proves the little value of this character). In *Cassine*, a Cape bush, the leaves are opposite, and the fruit is a berry. The exarillate seeds are, like the two ovules in each cell, descending instead of ascending. *Hartogia*, a Cape bush, has also opposite leaves, and in each cell two ovules; but they are ascending. The cells are incomplete, and the fruit indehiscent and dry, with exalbuminous seeds. *Rhacoma*, a bush of tropical America, has leaves placed like those of *Elæodendron*, and also the fruit indehiscent, drupaceous, or dry; but the ovarian cells have only one ascending ovule. *Ptelidium*, a Malagash bush, with opposite leaves, has the 4-merous flowers and 2-ovulate cells of *Elæodendron;* but its fruit is an oval or subcordate samara, with a thick and woody marginal wing. In *Zinowiewia*, a Mexican shrub, we also observe the opposite leaves, the inflorescence, the pentamerous flower and the biovulate cells of *Elæodendron;* but the fruit is a compressed linear, oblong samara, surmounted by a membranous, dolabriform, vertical wing a little lateral, and in particular terminal.

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[1] The genus *Alzatea* R. et Pav. placed near the preceding, but without any certainty, because no one since Pavon has been able to study it, is distinguished by its campanulate calyx, its apetalous 5-androus flowers, and a bilocular obcordate ovary, followed by a loculicidal capsule of the same form, with numerous superposed winged seeds. It is a Peruvian shrub, with opposite entire leaves and flowers in terminal corymbiform cymes.

In a small separate group (*Pleurostylieæ*) are placed *Pleurostylia*, bushes of India and Madagascar, which have the opposite leaves and the floral characters of the preceding genera, but in which the ovary contains only one eccentric cell, with two ascending ovules, and an equally eccentric style. We place near it *Cathastrum*, a bush of the Cape, which has also opposite leaves and an eccentric and unilocular ovary, but whose parietal placenta supports two vertical and parallel series of ascending ovules.

Celastrus has also given its name to a sub-series (*Celastreæ*) in which the leaves are always alternate (a convenient character to consult in practice, but whose slight value will be marked). They have a convex plane or concave receptacle, two or more ascending ovules in each cell, like *Euonymus*, and like it, capsular fruit and arillate seeds. They are bushes of the hot and temperate regions of the whole world, often climbing or thorny. *Gymnosporia* cannot be generically separated from it, as was thought, because of the union to the cavity of the receptacle of the base of their ovary; neither can *Putterlickia*, African plants, whose habit is exactly that of certain *Gymnosporia*, but whose ovarian cells are pluriovulate.[1] The capsule is voluminous, with a coriaceous partition. These plants are to the other species of *Celastrus*, by the number of their ovules, what *Euonymus angustifolius*, *americanus*, etc., are to the species with biovulate cells. *Maytenus*, which inhabits the tropical and sub-tropical regions of South America, has been hitherto generically separated from *Celastrus*, and it was formerly distinguished from it especially, for sometimes having uniovulate ovarian cells. But ovules often occurring to the number of two, ascendent, and with micropyle exterior, it is impossible to retain this as a distinct genus; it can only form a section of the genus *Celastrus*.

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[1] *Denhamia*, Australian plants, with capsular osseous fruit, are also distinguished from *Celastrus* by pluriovulate ovarian cells. But there are species such as *D. pittosporoides*, F. Muell., which certainly have only two ovules in certain cells.

Schæfferia may be considered as *Maytenus* diminished, inasmuch as the tetramerous flowers are unisexual, diœcious, and the two cells of the ovary enclose only one ascending ovule in each. The short style is dilated in two stigmatiferous lobes, themselves bilobed, and the fruit is drupaceous, slightly fleshy, with two monospermous stones. They are bushes of the Antilles and of the southern parts of North America; the inflorescence is axillary. *Wimmeria*, Mexican shrubs, resembling by their organs of vegetation certain species of *Celastrus* of the section *Putterlickia*, have also pluriovulate ovarian cells. But the fruit is indehiscent and provided with large membranous wings. In *Polycardia*, very curious shrubs of Madagascar, the flowers are also those of *Celastrus*, with an ovary basally imbedded in the receptacle, and with biovulate cells; the fruit is a loculicidal capsule, with three, four, or five valves; but the flowers, united in small glomerules, are raised to the middle or even to the summit of the upper surface of the principal nervure of the axillate leaf. In *Pterocelastrus*, bushes of Southern Africa and New Caledonia, the inflorescence, independent of the leaves, is formed of compound cymes, terminal or axillate, and the flowers are nearly those of *Polycardia*. But the fruit is a loculicidal capsule, with three or six vertical wings, the seed of which is, either surrounded by an aril, or bordered by a marginal wing. *Kurrimia*, trees of tropical Asia, have a dry fruit, with one or two cells dehiscent or indehiscent. Their ovary is surmounted by a style of two long and slender branches, each terminated by a small capitate stigma. *Perrottetia*, bushes of Mexico, Columbia, and tropical Oceania, with slender inflorescence, and generally much ramified, have nearly valvate or slightly imbricated triangular petals, and an ovary with two cells more or less incomplete, biovulate, often incompletely divided into two half cells by a false partition interposed between the ascending ovules. The fruit is dry or little fleshy, nearly globular, indehiscent. *Fraunhofera*, a

Brazilian shrub, is distinguished from *Perrottetia*, whose slender inflorescence it has, only by the configuration of its dry, long, and siliquiform fruit; for its two cells, if frequently uniovulate, may also here and there contain two ascending ovules.[1] *Plenekia*, Brazilian trees, with leaves of the elder or poplar, have also an elongated, dry fruit; it is a samara, whose vertical and membranous wing recalls that of *Ventilago*. It encloses one or two cylindrical, elongated, exarillate seeds. The flower is that of a *Celastrus*, with two ovarian biovulate cells. In *Tripterygium*, a bush of the island of Formosa, all is also like a *Celastrus*, with three biovulate ovarian cells; but the indehiscent and trigonal fruit is said to be furnished with three large membranous wings, and encloses only one seed with a small albuminous embryo.

Texas and New Mexico possess three generic types with alternate leaves, but exceptional on various grounds. One of them is *Mortonia*, a genus formed of two or three bushes, with numerous small coriaceous persistent leaves, and with small flowers, whose receptacle is very concave, like that of many *Rhamnaceæ*. The pentamerous perianth and andrœcium are there very strongly perigynous, and the inferior ovary has five oppositipetalous, incomplete, and biovulate cells. The fruit, imbedded in the concave receptacle, is dry and indehiscent. *Glossopetalon*, a prickly bush, with small leaves, the upper ones reduced to scales, has a small cupuliform receptacle, five sepals, five elongated tongue-shaped petals, and ten stamens disposed in two verticils round a disk, the centre of which is occupied by a unilocular and biovulate ovary. Its fruit is elongated, striate, dry, with one or two arillate and ascending seeds. *Canotia*, a thorny, almost leafless shrub, has also pentamerous, but isostemonous flowers, and a gynæcium with five-celled ovary and pluriovulate cells. Its fruit is an elongated apiculate loculicidal capsule, with five bifid valves at the summit. Each encloses one ascending, albuminous seed, prolonged inferiorly to a narrow and elongated membranous wing.

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[1] *Siphonodon* GRIFF, Javan and Australian plants, abnormal in this group, cannot however, as it appears, be far removed from the preceding genera, from which they are immediately distinguished by their deep receptacular cup enclosing an ovary formed of numerous uniovulate cells (which have been regarded as five multiovulate cells, divided into uniovulate compartments by numerous false partitions), and by the axis of their gynæcium presenting a a deep depression from the centre of which rises a styliform column almost gynobasic.

II? STACKHOUSIA SERIES.

Stackhousia[1] (fig. 8–11), which has been made a distinct family, has regular and hermaphrodite flowers. The receptacle has the form of a hemispheric cup, the cavity of which is covered with a glandular disk. Outside the more or less salient or often but slightly developed edges of this disk, the lips of the receptacle give insertion to the perianth and to a perigynous andrœcium, viz., to five imbricated sepals and five petals alternating with them, much longer exserted, free and remaining so in their lower and upper parts, whilst for a variable extent of the intermediate part they approach and unite by their margins in an elongated tube resembling that of a gamopetalous corolla. The limb is imbricated in prefloration. The stamens are the same in number as the petals, alternating with them, each formed of a filament free or connate with the corolla and an anther bilocular, introrse, dehiscing by two longitudinal clefts.[2] Generally two of these stamens, the lateral, are much shorter than the three others. The gynæcium is free to the bottom of the receptacular cup; it is formed of an ovary, often with three, more rarely with two, four or five cells, surmounted by a style divided more or less deeply into stigmatiferous slips equal in number to the ovarian cells. The latter present, near the base of their internal angle, an ascending, anatropous ovule with mycropyle primarily directed downwards and outwards, later turned a little laterally. The fruit is dry, often formed of two or three achenes[3] which finally separate from the central column, itself divided into as many fine threads as there are carpels. They

Stackhousia monogyna.

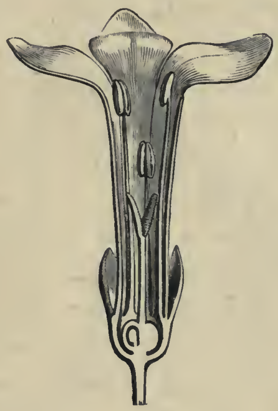

Fig. 8. Long. sect. of flower (4/1).

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[1] Sm. *Trans. Linn. Soc.* iv. 218.—Endl. *Gen.* n. 5763.—Lindl. *Vég. Kingd.* 589, fig. 400.—Schuch. *Linnæa*, xxvi. 1.—B. H. *Gen.* 371, 998.—H. Bn. *Payer Fam. Nat.* 219; *Adansonia*, xi. 289.—Schnizl. *Iconogr.* t. 250.—Benth. DC. *Prodr.* xv. sect. i. 500.—*Tripterococcus* Endl. *Enum. Pl. Huegel.* 17; *Gen.* n. 5764.—*Plokiostigma* Schuch. *loc.cit.* 39.

[2] "Pollen sub-4–lobum echinulatum."—(Benth).

[3] The mesocarp is often at first somewhat fleshy and separable from the putamen.

contain each a seed, the membranous integuments of which enclose a fleshy albumen. Its axis is occupied by an embryo of equal length with cylindrical and inferior radicle and cotyledons plane or plano-convex and more or less thick.

There are some *Stackhousias* of which a special genus has been made under the name of *Tripterococcus* (fig. 9–11). The three achenes[1] of its fruit are prolonged each in three vertical wings of which one is dorsal and two are marginal, the latter much more developed than the former (fig. 11). The corolla is generally longer and narrower than that of the other species of the genus, and its pieces are terminated by a long point. Thus composed, the genus *Stackhousia* contains a dozen species[2] of herbs, sometimes frutescent at the base, with a woody subterranean rhizome, aerial herbaceous branches, clothed with alternate leaves, and stipules none or very little developed. Its flowers[3] are terminal, sometimes solitary, oftener collected in simple or compound clusters; they are inserted in the axils of alternate bracts and accompanied with lateral bracteoles.

Stackhousia (Tripterococcus) Brunonis.

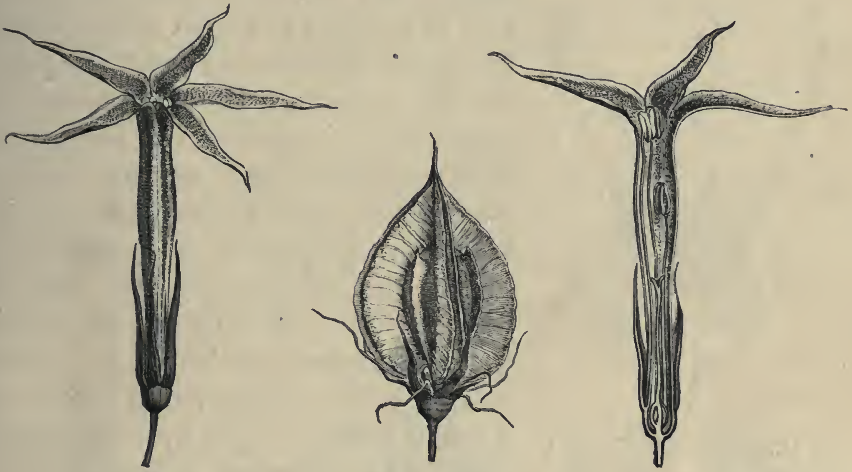

Fig. 9. Flower. ($\frac{4}{1}$). Fig. 11. Fruit ($\frac{2}{1}$). Fig. 10. Long. sect. of flower ($\frac{4}{1}$).

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[1] At first the mesocarp is a little fleshy, and the wings separate from the hard and striated putamen, externally very rugose.

[2] Labill. *Pl. Nouv.-Holl.* i. 77, t. 104.—Sieb. in *Spreng. Syst. Cur. Post.* 124; *Hook. Journ. of Bot.* ii. 421.—Hook. *Icon.* t. 269.—Lindl. *Bot. Reg.* t. 1917.—Sm. *Rees Cycl.* xxxiii.—A. Rich. *Voy. Astrol. Bot.* 89, t. 33.—Hook. f. *Fl. Tasm.* i. 79; *Fl. N.-Zel.* i. 47; *Man. N.-Zeal. Fl.* 42.—F. Muell. *Trans. Phil. Soc. Vict.* i. 101; *Pl. Vict.* ii. t. 14; *Fragm.* ii. 359; iii. 86.—Benth. *Fl. Austral.* i. 405.—Walp. *Ann.* v. 768, 770 *Tripterococcus*); vii. 585.

[3] White or yellow.

All are of Australian origin except two, one from New Zealand, the other from the Philippine Isles.

III. GOUPIA SERIES.

In *Goupia*[1] (fig. 12), the flowers are regular and hermaphrodite, with a small receptacle which supports a gamosepalous calyx with five divisions imbricated in prefloration, and five alternate petals, much longer, valvate-induplicate in the bud, and reflexed in such a manner that their attenuated summits hang in the interior of the bud like the key of a vault. Within the corolla, the receptacle bears an annular disk in the form of a short collarette with five salient festoons in front of the petals. In the crenatures of the festoons, and consequently in the intervals between the petals, are inserted five stamens, the short filaments of which are attached by their base exactly opposite the internal face of the disk, whence they are free and support each a bilocular introrse anther. The connective terminates in a point covered with straight apical hairs, and its short cells each open by a longitudinal cleft. The gynæcium is composed of a free ovary, but surrounded by the disk, with five oppositipetalous cells, each surmounted by a small eccentric stylary branch. In the internal angle of each cell is a placenta bearing two vertical series of numerous anatropous nearly horizontal or ascending ovules. The fruit is a small berry, nearly globular, the cells of which, variable in number, enclose each some ascending seeds. The latter contain under their integuments a fleshy albumen which envelopes an axilate curved embryo, with cylindrical radicle and elongated cotyledons. Only one *Goupia*[2] is known; it is a small tree from

Goupia glabra.

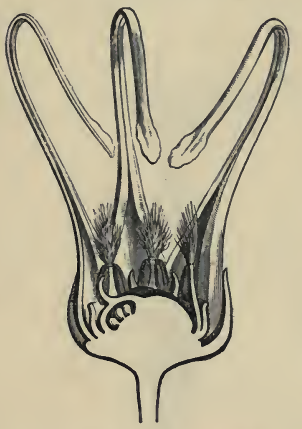

Fig. 12. Long. sect. of Flower ($\frac{6}{1}$).

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[1] Aubl. *Guian.* i. 295, t. 116.—J. *Gen.* 378.—Lamk. *Dict.* iii. 15; *Ill.* t. 217.—DC. *Prodr.* ii. 29.—Benth. *Hook. Kew Journ.* iv. 11.—Endl. *Gen.* n. 5696.—Miers, in *Ann. Nat. Hist.* ser. 3, ix. 289, 293; *Contrib. to Bot.* ii. t. 74.—B. H. *Gen.* 369, n. 35.—H. Bn. *Payer Fam. Nat.* 325.—Reiss. *Mart. Fl. Bras. Celastr.* 34.—*Gupia* J. S. H. *Exp. Fam.* ii. 267.—*Glossopotalum* Schreb. *Gen.* n. 526.

[2] *G. glabra* Aubl.—Walp. *Rep.* i. 539; *Ann.* iv. 427; vii. 583.—? *G. tomentosa* Aubl.—*Glossopetalum glabrum* Schreb. *loc. cit.*—W. *Spec.* n. 588.

Guyana, with leaves alternate, petiolate, entire, coriaceous, glabrous, penninerved, reticulate, subtriplinerved at the base, accompanied by two very small caducous stipules. Its flowers are inserted in the axil of the leaves in (spurious) umbels supported by a small common peduncle.

IV. AZIMA SERIES.

In this group, long considered as forming a special family under the name of *Salvadoraceæ*, we may study first *Azima*[1] *scandens* (fig. 13–15), formerly described as type of the genus *Actegeton.*[2] Its flowers are ordinarily tetramerous and polygamo-diœcious. The calyx, gamosepalous and valvate, is divided above into four lobes.[3] The petals, alternate, sessile, narrow and elongated, soon cease to touch at the margins. In the intervals are inserted, on a narrow receptacle, four stamens whose thick free filaments, in the male flower, are inserted round a rudimentary gynæcium, and are each surmounted by a bilocular introrse anther dehiscing by two longitudinal clefts. It is sterile in the female flowers in which the corolla and andrœcium are united below in a very short tube, with a free superior gynæcium, consisting of an ovary with two cells, surmounted by a short style, soon divided into two large branches, stigmatiferous within and on the margins.

Azima (*Actegeton*) *scandens.*

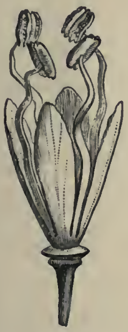

Fig. 13. Male flower, perianth removed ($\frac{5}{1}$).

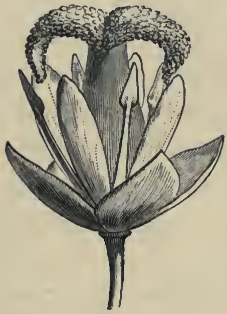

Fig. 14. Female flower.

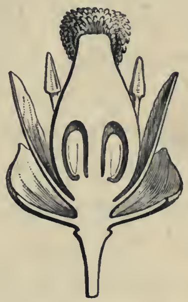

Fig. 15. Long. sect. of female flower.

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[1] LAMK. *Dict.* i. 343 (1783); *Ill.* t. 807.—J. *Gen.* 425.—A. DC. *Prodr.* xvii. 29.—*Monetia* LHER. *Stirp.* 1, t. 1.—ENDL. *Gen.* n. 5711, 6891. —H. BN. *Adansonia*, ix. 285, 289.

[2] BL. *Bijdr.* 1143.—ENDL. *Gen.* n. 5693 (*Actegiton*).—H. BN. *Adansonia*, ix. 282, t. 10, fig. 1–3.—A. DC. *loc. cit.* 20.

[3] Equal or unequal, as if caused by the tearing of a monophyllous envelope.

Each cell is divided by a false partition, sometimes incomplete, into two cellules containing each one seed nearly basilar, ascending, with micropyle at first directed downwards and outwards, ultimately becoming more or less lateral in consequence of a slight twist. The fruit is a berry enclosing from one to four seeds. Under the integuments is found a thick fleshy embryo, ellipsoid, or nearly orbicular, with conical inferior radicle, partly concealed by the auriculate base of the plano-convex cotyledons. In another species of the genus, *A. tetracantha*,[1] type of a section *Monetia*,[2] the flowers and fruit are the same, except that the lobes of the style are much less developed, and that each ovary cell contains but one instead of two ovules. Thus constituted, the genus *Azima* comprises two or three shrubs,[3] sometimes sarmentous, natives of the warm regions of Eastern Africa, Southern Asia, and the Indian Archipelago. The glabrous and tetragonal branches bear opposite, articulate, coriaceous leaves, furnished with two small lateral stipules; in the axils are from two to six spines representing the principal hardened nervures of the first leaves of the axillary branch.[4] The flowers[5] are in the axils of the leaves (or of the bracts which take their place), in simple or ramified clusters with decussate divisions, the florets springing inferiorly from a receptacular cavity at the bottom of which is articulated the attenuated summit of the pedicel.

Beside the *Azimas* are ranged the *Doberas*, which grow in the same regions and possess the same organs of vegetation and fructification, but the flower, polygamous and ordinarily tetramerous, possesses within each petal a flattened glandular scale, while their stamens are monadelphous to near the middle of their filaments, and their superior ovary is reduced to a single uniovulate cell and one or more sterile cellules.

Salvadora (fig. 17–20) constitutes a type reduced from the preceding, with hermaphrodite or unisexual, tetramerous, tetrandrous flowers, and only one uniovulate ovarian cell, surmounted by a short stigmatiferous prominence. But the petals, large and very distinctly imbricated or twisted in the bud, are so closely united below by means of the alternate staminal filaments that the latter seem inserted on the corolla which appears in adult age like a perfectly gamopetalous envelop (fig. 17, 18). The *Salvadoras*, of which one or two species are found in tropical Asia and Africa, have opposite leaves accompanied by small stipules, and numerous small flowers, arranged in simple or more or less ramified spikes.

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[1] Lamk. *loc. cit.*—A. DC. *loc. cit.* 29, n. 1.—? *A. nova* Blanco, *Fl. Filip.* ed. 2, 49.—*Fagonia Montana* Hohen. *herb.*—*Monetia barleroides* Lher. *loc. cit.*—H. Bn. *Adansonia*, ix. 285.

[2] Sect. *Azima* H. Bn. *loc. cit.*

[3] Wight. *Ill.* t. 152.—Harv. and Sond. *Fl. Cap.* i. 474 (*Monetia*).—Tul. *Ann. Sc. Nat.* sér. 4. viii. 113 (*Monetia*).—Walp. *Rep.* i. 541 (*Monetia*); *Ann.* i. 16.

[4] H. Bn. *Adansonia*, ix. 286.

[5] Small, white or pink, odorous.

Salvadora persica.

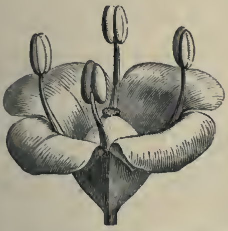
Fig. 17. Hermaphrodite flower.

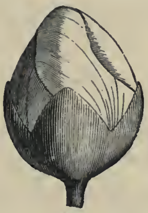
Fig. 16. Bud ($\frac{10}{1}$).

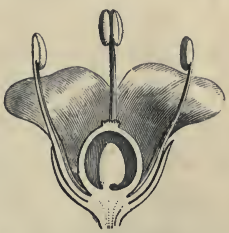
Fig. 18. Long. sect. of flower.

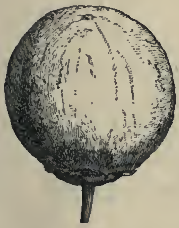
Fig. 19. Fruit ($\frac{4}{1}$).

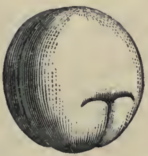
Fig. 21. Embryo.

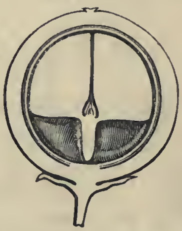
Fig. 20. Long. sect. of fruit.

V. HIPPOCRATE SERIES.

The flowers of *Hippocratea*[1] are closely analogous to those of Euonymus, regular and hermaphrodite. The receptacle, more or less flattened, bears a short calyx of five sepals, free, or united only at the base, imbricated or nearly valvate, with five alternate petals, longer, erect or expanded, imbricate or valvate in the bud. The andrœcium is ordinarily formed of three fertile stamens, each with a free filament, generally enlarged near the base and recurved at anthesis, inserted under the ovary, within a thick glandular disk, very variable in form, with which the receptacle is covered. The anther is bilocular,[1] extrorse, often didymous, dehiscing by two longitudinal clefts which often become confluent in their upper part.[2] The ovary is more or less deeply buried in the central cavity of the disk, and its three cells, alternate with the stamens, contain in their inner angle a placenta bearing two ascending ovules with micropyle exterior and inferior, or two or three pairs of ovules in two parallel series, ascending or horizontal. The ovary extends upwards in a style, the stigmatiferous summit of which is either not enlarged, or dilated in three lobes. The fruit generally consists of three dry carpels, united only near the base, then dilated in their free part to a compressed hollow, elliptic or orbicular, indehiscent or opening in two lateral valves by a double longitudinal cleft, ventral or dorsal. Each encloses one or many ascending seeds, often prolonged to membranous wings, imbricate in their lower part, whose superior tegumentary cavity contains a thick and fleshy embryo, with cotyledons often united in a single mass, and short inferior radicle. The *Hippocrateæ* consist of small climbing trees from all the tropical regions of both worlds. Their leaves are opposite, articulate, simple, accompanied by two small caducous stipules.

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[1] *Hippocratea* L. *Gen.* n. 54.—J. *Gen.* 251.—Lamk. *Dict.* 395; Suppl. i. 606; *Ill.* t. 28.—DC. *Prodr.* i. 567.—Turp. *Dict. Sc. Nat.* Atl. t. 162.—Spach. *Suit. à Buffon*, ii. 399.—Endl. *Gen.* n. 5700.—Payer, *Organog.* 163, t. 35.—H. Bn. *Payer Fam. Nat.* 326.—B. H. *Gen.* 369, 998, n. 36.—Hook. *Fl. Ind.* i. 623.—*Coa* Plum. *Gen.* 8, t. 35.—*Pereskia* Velloz. *Fl. Flum* .34, i. t. 81 (not Mill. nor Plum.).—*Bejuco* Lœfl. *It.* 404.—*Daphnikon* Pohl, *Flora* (1825), 183 (from Endl.).— ? *Romualda* Tr. *Ann. Sc. Nat.* sér. 5, xvi. 370.—*Cuervea* Tr. (ex B. H.).

Hippocratea obtusifolia.

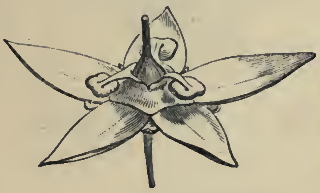

Fig. 22. Flower ($\frac{6}{1}$).

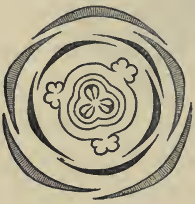

Fig. 23. Diagram.

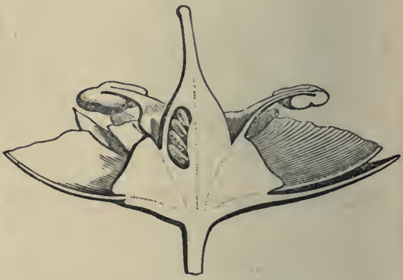

Fig. 24. Long. sect. of flower.

Hippocratea obtusifolia.

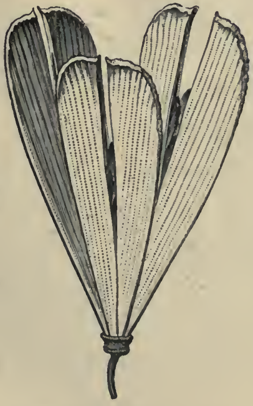

Fig. 25. Fruit.

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[1] Each cell often divides into two cellules for a longer or shorter time distinct.

[2] The pollen is similar to that of the *Celastreæ* in general.—(H. Mohl, *Ann. Sc. Nat.* sér. 2, iii. 838.)

Their flowers[1] are united in axillary, simple, or more or less ramified, and sometimes umbelliform cymes, with pedicels accompanied by two lateral bracteoles. More than fifty species[2] are known; they have sometimes two or even four or five stamens, two or three of which are sterile and antherless.

The *Salaceæ* (fig. 26, 27), plants from the same tropical regions as the *Hippocrateæ*, often have the same habit and foliage; and their flowers present the same organisation. But their fruit, one or many-seeded, is destitute of wings, globular, or pear-shaped, often coriaceous or ligneous on the surface, pulpy within, with one or several seeds, ordinarily ascending, nude, or partially enveloped in an aril springing from the umbilicum, and containing an embryo similar to that of the *Hippocrateæ*, or thinner, with cotyledons nearly foliaceous, and, in this case, surrounded by a fleshy albumen of very variable thickness. The plants of this series are therefore very analogous in organisation to those of the *Euonymus* Series. So far they are scarcely distinct except in the fertile stamens being fewer in number than the petals.

Salacia viridiflora.

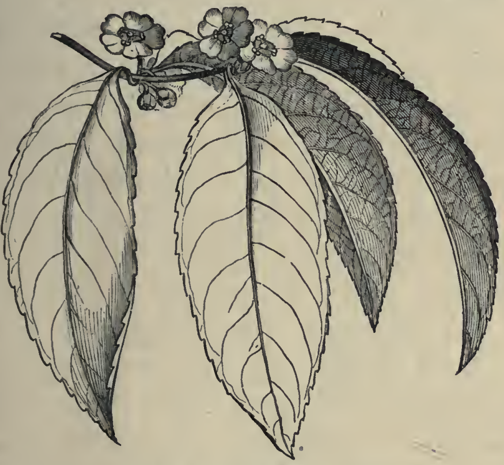

Fig. 26. Floriferous branch.

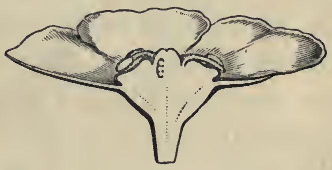

Fig. 27. Long. sect. of flower ($\frac{2}{1}$).

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[1] White, yellow, or greenish.

[2] R. et Pav. *Fl. Per.* t. 47.—Roxb. *Pl. Coromand.* t. 130, 205.—Rudg. *Guian.* t. 8, 9.—Bl. *Bijdr.* 218.—A. S. H. *Fl. Bras. Mer.* ii. 102.—Wight and Arn. *Prodr.* i. 103.—Wight, *Ill.* t. 46, 47; *Icon.* t. 380, 963.—Guillem et Perr. *Fl. Seneg. Tent.* i. 111, t. 25, 26.—Oliv. *Fl. Trop. Afr.* i. 366.—Tul. *Ann. Sc. Nat.* sér. 4, viii. 91.—Griseb. *Fl. Brit. W.-Ind.* 148.—Walp. *Rep.* i. 400; ii. 812; v. 146; *Ann.* ii. 193; vii. 583.

But the transition is now still more gradual since the discovery in Angola of the *Campylostemon*, a climbing shrub with opposite leaves, and possessing, it is said, pentamerous flowers, five alternipetalous stamens, with introrse and transverse dehiscence.

VI. BOX SERIES.

The *Boxes*[1] (fig. 28-34), long referred to the family of the *Euphorbiaceæ*, have regular and unisexual apetalous flowers. The calyx of the male flower is formed of four sepals, alternately imbricated in prefloration. Superposed to them are four stamens, each formed of a thick filament, long and free, inserted under the four faces of a central cuboid body (rudimentary gynæcium?) whose angles project more or less into the intervals, and a bilocular introrse anther dehiscing by two longitudinal clefts.[2] In the female flowers, the perianth is more ordinarily formed of six imbricate folioles, alternating on two trimerous verticils and surrounding a gynæcium, the ovary of which has three cells, each enclosing two ovules, inserted near the top of the internal angle, descending, anatropous, with raphe primarily dorsal and micropyle directed upwards and inwards. The summit of the ovary is generally surmounted by six projections. Three of these, slightly developed, correspond to the partitions, and the three others, more considerable, corresponding to the cells, are stylary branches, of eccentric insertion,[3] which diverge and separate at the summit into two short lobes. The internal margin of these styles is traversed by a longitudinal furrow, the reflexed lips of which are covered with stigmatiferous papillæ. The fruit is a tricoccous and loculicidal capsule which at maturity separates into three pannels.[1] Each of these is surmounted laterally by two distant halves of two different stylary branches and bears on the

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[1] *Buxus* T. *Inst.* 578, t. 345.—L. *Gen.* n. 1053.—ADANS. *Fam. des Pl.* ii. 355.—J. *Gen.* 388.—GÆRTN. *Fruct.* ii. 125, t. 108.—LAMK. *Dict.* i. 510; Suppl. i. 742; *Ill.* t. 761.—A. JUSS. *Tent. Euphorbiac.* 13, t. 1, fig. 3.—NEES, *Gen.* t. 56.—SPACH, *Suit. à Buffon*, ii. 491.—ENDL. *Gen.* n. 5869.—H. BN. *Bull. Soc. Bot. de Fr.* iii. 285; *Monogr. des Buxac. et des Stylocér.* (1859), 2, 58, t. 1, 2; *Adansonia*, xi. 283.—M. ARG. *Prodr.* xvi. p. 1, 13.—*Tricera* SW. *Prodr.* i. 333, t. 7.—ENDL. *Gen.* n. 5868.—*Crantzia* SW. *Prodr.* 38 (not LAG. nor NUTT. nor SCHREB. nor SCOP.).

[2] The pollen grains are spherical with very fine pores.

[3] They approach the centre in a species from the Antilles, *B. subcolumnaris* M. ARG.

Buxus sempervirens.

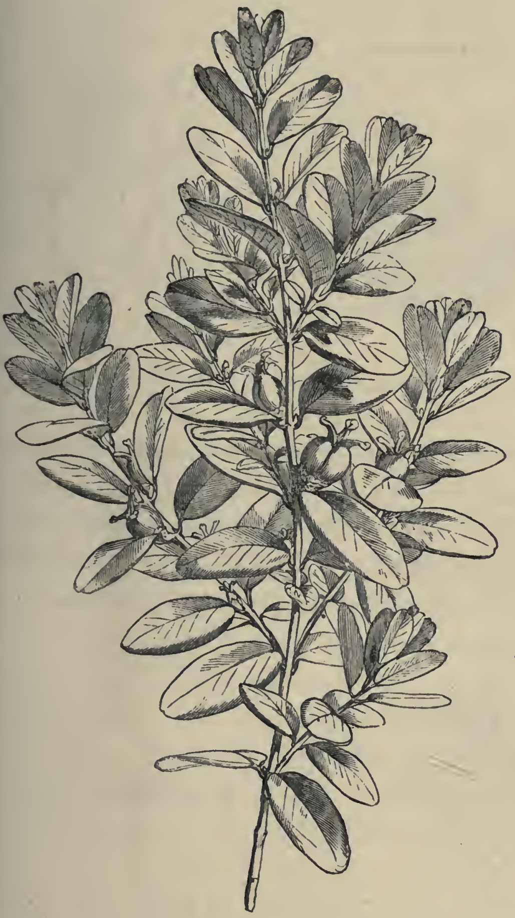

Fig. 28. Fructiferous branch.

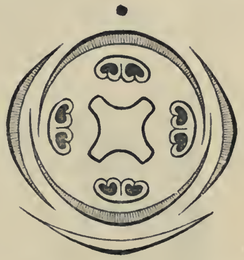

Fig. 30. Male flower, diagram.

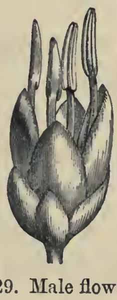

Fig. 29. Male flower ($\frac{3}{1}$).

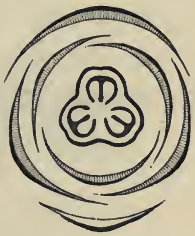

Fig. 32. Female flower, diagram.

middle of its internal surface a partition, on each side of which is generally a descending seed. Its thick smooth integuments enclose an abundant fleshy albumen, surrounding an embryo more or less curved, with superior elongated radicle, and thick elliptical or oblong cotyledons. The large anfractuose cavity of the seminal hilum is covered by a fleshy aril, but slightly developed and solely of umbilical origin.[1]

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[1] The dried endocarp separates entirely from the more external layers of the pericarp.

The *Boxes* are shrubs or small trees, which inhabit Europe, Asia, Eastern Africa, Central America, and especially the Antilles: some twenty species[2] are known.

Boxus sempervirens.

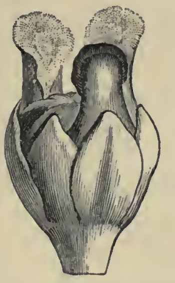

Fig. 31. Female flower ($\frac{4}{1}$).

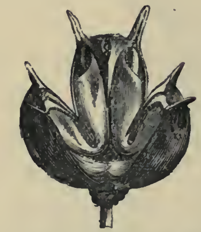

Fig. 34. Dehiscent fruit.

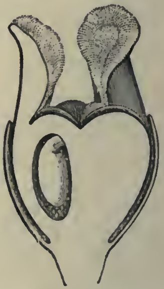

Fig. 33. Long. sect. of female flower.

Their leaves are opposite, entire, without stipules, the organs described as such being only the first pairs of leaves of the branches often reduced to small scalelike or bractiform tongues. Sometimes the axillary buds are multiple and superposed, being more voluminous the higher they are situated. The flowers, most frequently monœcious, are collected in false umbels or in false capitules. The female flowers are sometimes solitary; or one of them more generally occupies the centre of the inflorescence, enveloped by several imbricate bracts, in many series, similar to the sepals, and surrounded by the male

Pachysandra procumbens.

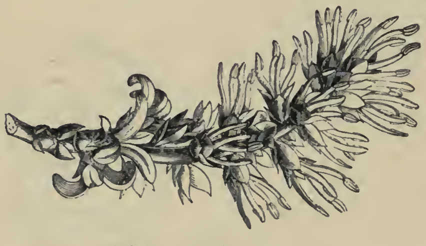

Fig. 35. Inflorescence.

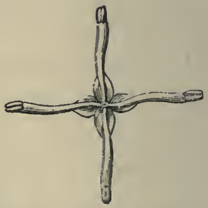

Fig. 36. Male flower in bloom.

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[1] On its mode of development, see H. Bn. *Monogr. Buxac. et Styloc.* 35.

[2] Thunb. *Fl. Jap.* 77.—Duham. *Arbr.* i. 82. Reichb. *Ic. Fl. Germ.* v. t. 153.—Gren. et Godr. *Fl. de Fr.* iii. 101.—W. *Spec.* iv. 337.—A. Rich, *Fl. Cub.* t. 71 (*Tricera*).—Griseb. *Fl. Brit. W.-Ind.* 31.—Boiss. *Diagn. Pl. Or.* xxii. 107.—H. Bn. *Buxac.* 58; *Adansonia*, xi. 268.

flowers which are sometimes sessile as in the *Boxes* proper,[1] and sometimes pedicellate, as is more frequently the case in certain species from the Antilles of which the genus *Tricera* [2] has been made.

Beside the *Boxes*, this sub-series (*Eubuxeæ*) includes two genera with alternate leaves and elongated inflorescence, in which the female flowers occupy the base and the male the summit. These are *Pachysandra* (fig. 35, 36), and *Sarcococca*. The former are perennial herbaceous plants, of which one species inhabits North America, and the other Japan. Their fruit is finally dry, thin, and dehiscent, and their seeds, analogous to those of the *Boxes*, are furnished with an umbilical aril, which is prolonged somewhat over the summit of the raphe. The latter, all natives of Southern Asia or Java, are shrubs or small trees, with fleshy fruit, and indehiscent.

Simmondsia, a Californian shrub with opposite leaves, of which one or two species are known, constitute by themselves a small sub-series (*Simmondsieæ*), in which the unisexual flowers have, either a dozen or more stamens arranged in two or three series, or an ovary with three uniovulate cells. The fruit is capsular and loculicidal, furnished with a filiform tripartite columella.

In the small group of *Stylocereæ*, consisting of a single genus *Styloceras*, the organisation of the gynæcium and the eccentric insertion of the long styles are fundamentally the same as in the preceding types. But in the female flowers, often furnished with a perianth, the ovarian cells are reduplicated into uniovulate half-cells by false centripetal partitions which advance between the two ovules of the same cell. The male flowers are without a calyx, and consist solely of a variable number (5–30) of nude and central stamens. They are trees of South America, with alternate coriaceous leaves without stipules, and axillary amentiform inflorescence, unisexual or bisexual.

VII. GEISSOLOMA SERIES.

The *Geissolomas* [3] (fig. 37, 38) have regular hermaphrodite flowers, monoperianthus and tetramerous. The calyx is formed of four sepals, of which two are lateral, one posterior and one anterior, united only in quite their lower part, and imbricated in prefloration.[1] The andrœcium is composed of eight stamens, inserted a little below the base of the perianth, arranged in two verticils, four, a little longer, are superposed to the folioles of the perianth. All have a free subulate filament and an oval introrse bilocular anther dehiscing by two longitudinal clefts. The gynæcium, free, superior, is formed of an ovary with four cells, alternate with the sepals, each surmounted by a subulate stylary branch, traversed within by a longitudinal furrow and terminated by a stigmatiferous extremity not enlarged. The four branches of the style intertwine in early age. In the internal angle of each cell is observed a placenta bearing two collateral descending ovules with micropyle directed upwards and inwards, and the raphe in the neighbourhood of the umbilicum exhibits an incipient arillary thickening. The fruit is a four-celled capsule, accompanied by a persistent calyx and surmounted by the remains of the style. The cells open at the back by a longitudinal cleft. The seed contained in them is elongate, a little flattened, with a smooth and glossy testa of a deep colour.[2] The umbilical region is thickened to a small white aril, which descends as it stretches towards the head of the raphe, and is there lodged in a furrow of little depth and bordered by two vertical lips. The fleshy albumen envelopes an axillary embryo of nearly the same length,

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[1] *Eubuxus* H. Bn. *Buxac.* 58.—M. Arg. *Prodr.* 17, sect. 2.

[2] Sw. *Fl. Ind. Occ.* i. 333, t. 7.—Endl. *Gen.* n. 5868.—H. Bn. *Buxac.* 66.

[3] Lindl. ex K. *Linnæa*, v. 678.—A. Juss. *Ann. Sc. Nat.* sér. 3, vi. 19, 27, t. 4.—Sond. *Linnæa*, xxiii. 105.—Endl. *Gen.* n. 2118.—H. Bn. *Payer Fam. Nat.* 334; *Bull. Soc. Linn. Par.*

Geissoloma marginatum.

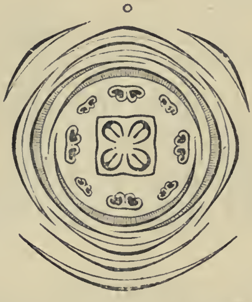

Fig. 37. Diagram of flower.

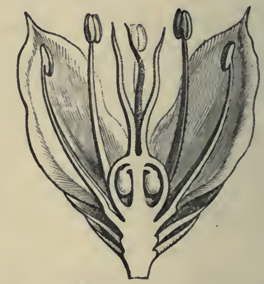

Fig. 38. Long. sect. of flower ($\frac{4}{1}$).

31; *Adansonia*, xi. 281.—A. DC. *Prodr.* xiv. 492.

[1] The two lateral envelop the two others, which are primarily contorted or imbricate, A. De Candolle has seen the lateral sepals interior.

[2] Similar to that of the *Boxes*.

with cylindrical superior radicle and linear fleshy cotyledons. The only *Geissoloma* known[1] is a Cape shrub, with the habit of a *Box*. Its tetragonal branches are clothed with opposite leaves,[2] oval or nearly so, sharp, entire, coriaceous, penninerved, accompanied by two very small lateral stipules.[3] Its axillary solitary and nearly sessile flowers are accompanied by from six to eight unequal, decussate, imbricate bracts, the shorter the more exterior they are.

The family *Celastraceæ* was proposed by R. Brown[4] in 1814. It did not exist with Adanson and with A. L. Jussieu, who left the genera of this group which were known to them, the former in his Jujube[5] family, the latter, following his example, in the order of Nerprun.[6] With both of them, it is true, these genera were comprised in a separate section on account of their alternipetalous stamens and the configuration of their receptacle. A. P. de Candolle,[7] in 1825, retaining the *Celastrineæ* as a distinct order of *Rhamneæ*, placed the *Staphyleæ* with the former as forming a first tribe, and the *Aquifoliæ* (Holly) as constituting a third. The second, *Euonymæ*, alone corresponding to the *Celastrineæ* of R. Brown and more recent standard authors, comprised eight genera—*Euonymus*, *Celastrus*, *Maytenus*, *Alzatea*, *Polycardia*, *Elæodendron*, *Ptelidium*, and *Tralliana*.[8] Endlicher[9] enumerated seventeen genera in his *Celastrineæ*, besides some doubtful types, among which are found *Carpodetus* (*Rosaceæ*) and *Phyllonoma* (*Saxifragaceæ*). In 1862 Bentham and Hooker[10] reunited in this family forty genera, one of which, *Llavea*,[11] of very doubtful affinity, comprised three genera, of *Hippocrateæ*, a small family the close affinity of which with the *Celastraceæ* had already been perceived by R. BROWN. Since then we have shown[1] that the genus *Canotia*, previously referred to the *Rosaceæ*, and the *Salvadoreæ*, till then considered as forming a distinct family of plants with gamopetalous corolla, ought to be included in the family of *Celastraceæ*.[2] We have elsewhere contended[3] that the *Boxes*, so long classed with the *Euphorbiaceæ*, should be separated from them and form, perhaps, diminished types of *Celastraceæ*, with apetalous and diclinous flowers. In a new and recent examination of this family we have been confirmed in our opinion by the study[4] of a small order lately considered autonomous, and formed of a single monotypic genus *Geissoloma*. This plant, hitherto allied with the *Penæaceæ*, though possessing none of the essential characters, is, in our opinion, much nearer the *Boxes*, intermediate between the latter on one side, and the diplostemonous *Celastraceæ*, such as *Glossopetalon*, on the other. We have also pointed out[5] why *Stackhousia*, whose floral organisation is exactly that of the *Celastraceæ*, could not be separated from them on account of its habit and foliage, seeing that the peculiarities it presents in this respect are found in certain genera of the next family, and yet no one has dreamed of separating them from the rest of the family of *Rhamnaceæ*. *Canotia*, which, as we have just said, can be placed only among the *Celastraceæ*, has also much of the habit of *Crumenaria* (*Rhamnaceæ*) and of *Stackhousia*. So we have comprised in this family seven series, the general characters of which we thus recapitulate:

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[1] *G. marginatum* A. Juss.—*Penæa marginata* L. *Mantiss.* 199.—Thunb. *Berl. Mag.* 1, t. 3; *Fl. Cap.* (ed. Sch.) 150.—Vent. *Malmais.* t. 87, fig. 1.

[2] Covered with simple hairs when young, thickened at the edges.

[3] Glanduliform, blackish.

[4] *Flind. Voy. Bot.* 22; *Misc. Works* (ed. Benn.) i. 27 (*Celastrineæ*).—*Celastraceæ* Lindl. *Veg. Kingd.* (1846), 586, Ord. 325.

[5] *Fam. des Pl.* ii. 303, sect. 1.

[6] *Gen.* 376, Ord. 13 (1789).

[7] *Prodr.* ii. 2, *Ord.* 55.

[8] Lour. *Fl. Cochinch.* (ed. 1790), 157.—DC. *Prodr.* ii. 11.—Endl. *Gen.* n. 5694. "Whether *Caryospermum* Bl. ?" (B. H.).

[9] *Gen.* 1085, Ord. 236.

[10] *Gen.* 357, Ord. 47.

[11] Liebm. *Kjoben. Ved. Meddel.* (1853), 95.—B. H. *Gen.* 370, n. 39.—Walp. *Ann.* iv. 424.—Very ramose small shrubs from Mexico (two species), with alternate leaves, unisexual, pentamerous, apetalous flowers, and trilocular ovary. The cells are pluriovulate, and the fruit is dry and furnished with three large wings. The male flower is unknown. The genus *Piptocelus* Presl (ex Turcz. *Bull. Mosc.* (1858). i. 449), has also been doubtfully referred to this family, but Bentham and Hooker (*Gen.* 360) say of it: "Verisimil. ab Ord. expellend. ob calyc. longit. ruptum, petala basi calyc. adnata, anther. acum. incurv. arillumque hirsutum." The genus *Cienkowskia* (Reg. et Rach, *Ind. Sem. Hort. Petrop.* (1858), 48, has been shown by us (*Bull. Soc. Linn. Par.* 143) to be synonymous with *Patagonula* (Cordieæ).

1. EUONYMEÆ.[6]—Flowers hermaphrodite or polygamous, isostemonous, rarely diplostemonous. Petals free, imbricate or valvate, inserted with the stamens outside the margins of a disk variable in form, convex, plane, or concave. Seeds ordinarily albuminous.—Trees or shrubs.—28 genera.

2. STACKHOUSIEÆ.[7]—Flowers hermaphrodite isostemonous. Petals

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[1] *Adansonia*, x. 18 (1871).

[2] *Adansonia*, ix. 277 (1870).

[3] *Monogr. Buxac. et Styloc.* 39 (1859).

[4] *Bull. Soc. Linn. Par.* 31; *Adansonia*, xi. 281 (1874).

[5] *Adansonia, loc. cit.* 290.

[6] DC. *Prodr.* ii. 3, trib. 2.—ENDL. *Gen.* 1085, trib. 1.—*Celastreæ* B. H. *Gen.* 360, trib. 1.—*Eleodendreæ* ENDL. *op. cit.* 1087, trib. 2.

[7] *Stackhouseæ* R. BR. *Flind. Voy.* ii. 555.—*Stackhousiaceæ* LINDL. *Introd.* ed. 2, 118; *Veg. Kingd.* 589, Ord. 226—*Endl. Gen.* 1106, Ord. 242.—*Stackhousieæ*, AG. *Theor. Syst. Plant.* 359, t. 26, fig. 12.—B. H. *Gen.* 371, Ord. 48.

elongate, united in a tube (and having the appearance of a gamopetalous corolla) for a variable portion of their extent, inserted with the unequal stamens outside the margin of a concave disk. Ovules solitary, ascending. The indehiscent cocci of the fruit separating from the columella. Seeds albuminous.—Herbs with perennial rhizomes.—1 genus.

3. GOUPIEÆ.[1] — Flowers hermaphrodite, isostemonous. Petals free, valvate-induplicate. Ovarian cells equal in number to the petals, pluriovulate. Styles not terminal.—Shrubs with alternate leaves, sub-3-plinervate.—1 genus.

4.—AZIMEÆ.[2]—Flowers polygamo-diœcious, generally 4-merous, isostemonous. Petals hypogynous, free or united (in a false gamopetalous corolla). Ovary with 1–4 uniovulate cavities. Ovule ascending. Fruit fleshy. Seeds without albumen.—Trees and shrubs, with leaves opposite.—3 genera.

5. HIPPOCRATEEÆ.[3]—Flowers hermaphrodite, with stamens ordinarily less numerous than the petals (generally three), inserted within a highly developed disk. Ovules 2-∞. Fruit often winged, dry, or fleshy. Seeds without albumen.—Woody plants, often climbing, generally with opposite leaves.—3 genera.

6. BUXEÆ.[4]—Flowers unisexual, apetalous, with hypogynous stamens, equal in number to or more numerous than the sepals. Disk 0. Ovarian cells with 1, 2 ovules, descending, and micropyle interior and superior. Fruit dry or fleshy.—Woody or herbaceous plants, with leaves opposite or alternate.—5 genera.

7. GEISSOLOMEÆ.[5]—Flowers hermaphrodite, apetalous, tetramerous, diplostemonous. Disk 0. Ovarian cells with 2 ovules, descending, and mycropyle interior and superior. Fruit capsular. Seeds albuminous.—A shrub, with opposite leaves.—1 genus.

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[1] *Goupiaceæ* MIERS. *Ann. Nat. Hist.* sér. 3, ix. 289.

[2] *Azimaceæ* WIGHT et GARDN. *Calc. Journ.* (1845).—*Salvadoraceæ* LINDL. *Introd.* (1836) 269; *Veg. Kingd.* 652, Ord. 250.—PL. *Ann. Sc. Nat.* sér. 3, x. 189.—A. DC. *Prodr.* xvii. 27, Ord. 127 *bis.*—*Salvadoreæ* H. BN. *Adansonia* x. 276.—*Monetieæ* H. BN. *loc. cit.* 289.

[3] B. H. *Gen.* 369, trib. 2.—*Hippocraticeæ* J. *Ann. Mus.* xviii. 483.—R. BR. *Congo*, 187.—*Hippocrateaceæ* H. B. K. *Nov. Gen. et Spec.* v. 136.—DC. *Prodr.* i. 567, Ord. 37.—ENDL. *Gen.* 1090, Ord. 237.—LINDL. *Veg. Kingd.* 584, Ord. 224.

[4] *Buxeæ* KL. *Tricocc.* 12 (part.).—*Buxineæ* DUMORT. *Anal. Fam. Nat.* 45 (part.).—PLÉE, *Typ. de Ch. Fam.* i. t. 74.—*Buxaceæ* KIRSCHLEG. *Fl. d'Alsace*, ii. 48.—AG. *Theor. Syst.* 292 (part.).—H. BN. *Monogr. Buxac. et Styloc.* (1859).—M. ARG. *Prodr.* xvi. sect. i. 7, Ord. 180.—*Euphorbiaceæ*, sect. i. (*Gen.* 2, 3) A. JUSS. *Tent. Euphorb.* 13.

[5] ENDL. *Enchirid.* 214.—*Geissolomaceæ* SOND. *Linnæa*, xxiii. 105.—A. DC. *Prodr.* xiv. 191, Ord. 166.

The family thus understood "by concatenation" has many affinities. By the isostemonous *Euonymeæ* with ascending ovules, it approaches the *Penœaceæ*, from which we shall find it differs chiefly in the organisation of its gynæcium; and the *Rhamnaceæ*, from which we shall distinguish it by one absolute character—the isostemony of the latter, with oppositipetalous stamens. By the *Buxeæ*, and also by the *Hippocrateæ* and *Euonymeæ*, it presents great resemblances to certain *Euphorbiaceæ*. But in the latter, which never have more than one or two descending ovules in each cell, the micropyle is directed upwards and outwards, whilst, in the corresponding cases, it is interior and superior in the *Celastraceæ*. The latter also approach the *Staphyleæ* (which are *Sapindaceæ*) and the *Ilicineæ*; but these last have been rightly referred to the families with gamopetalous corolla; and the former, closely allied as they are to the *Celastraceæ*, especially the *Hippocrateæ*, are distinguished from them either by the independence of their carpels, by their composite leaves, by the organisation of their fruit, by the form of their floral receptacle, and consequent mode of staminal insertion, by the isostemony of their andrœcium, or especially by several of these characters combined. The impossibility of establishing, by one or more technical characters, an absolute difference between the *Celastraceæ* and the various groups with which we have just compared them, arises from the fact that they themselves have not a single character which is not sometimes wanting. When their ovules are definite in number, they are ascending with the micropyle primarily exterior, or descending with the micropyle interior, but they may be neither descending, nor ascending, nor definite in number. Their floral receptacle is often convex or plane, and the insertion is then hypogynous; but the receptacle may, here and there, become extremely concave;[1] which entails the perigyny of the perianth and andrœcium. Their aerial branches are ordinarily woody;[2] but this character may sometimes be wanting in the exceptional type of *Stackhousia*.

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[1] As in *Mortonia*, and, to a less degree, *Perrottetia*, including *Caryospermum*, of which it has been rightly said that they are *Rhamnaceæ*, except that their stamens are alternipetalous.

[2] The structure of the *Celastraceæ* is especially interesting in the climbing species, as *Celastrus*, where we have seen the woody axis divided into three lobes, the separation being indicated externally by furrows spirally crossed (A. JUSS. *Malpigh.* 117). On the stem of *C. scandens*, see H. MOHL, *Ueb. d. Bau der Ranken- und Schling. Pfl.* Tubing. (1827), § 75. On that of *Euonymus*: LINDL. *Introd.* i. 213. OLIVER (*Stem Dicot.* 25) says that the organisation of the woods of *Salvadora* deserves the attention of botanists. We have pointed out in our *Monogr. des Buxaceæ*, the structure of the branches of *Sarcococca* (7), of the stems of the *Boxes* (8), of the rhizomes *Pachysandra* (10), of the roots, leaves, etc. (t. 2, fig. 1–12). On the *Box*, see also SCHACHT, *Der Baum*, 195.

Of the forty-one Genera which we unite in this family and which comprise about four hundred and fifty species, eighteen grow only in the old world and eleven only in the new. One third of the species belong to the latter. Like the *Euonymeæ*, the *Buxeæ* and the *Hippocrateeæ* are common to both worlds; but *Goupieæ* are found only in South America, *Geissolomeæ* only at the Cape, and *Stackhousieæ* only in Oceania, principally in Australia. There are some fifteen genera of *Euonymeæ* with an area extremely limited, as *Ptelidium* and *Polycardia* confined to Madagascar, *Wimmeria* to Mexico, *Tripterygium* to Formosa, *Glossopetalon*, *Canotia*, *Pachystima*, *Zinowiewia* and *Mortonia* to Texas and its neighbourhood, *Plenckia* and *Frauenhofera* to Brazil, and *Hartogia*, *Cathastrum* and *Cassine* to South Africa. Those whose geographical distribution is most surprising, because they belong to regions widely separate from one another, are: the *Boxes* which grow in temperate Europe and Asia on the one hand, and the Antilles on the other, and have just been observed in Madagascar and to the south of the Red Sea; *Pachysandra*, one of which is American, and another Japanese; *Perrottetia* which exists in Mexico and Columbia, as well as in Java and the Sandwich Isles; *Pterocelastrus* met with at the Cape and in New Caledonia; *Hippocratea* and *Salacia*, species of which are known in the four quarters of the world. The two genera *Celastrus* and *Euonymus*, as we limit them, present the widest geographical distribution. Represented in great number by their section *Maytenus* in South America, *Celastrus* is met with in North America, in China and Japan, in Asia and Oceania, in Madagascar and at the Cape, thence ascending in Africa to the Canary Isles and even to Spain in Europe. *Euonymus* comprises generally plants of less warm countries; they abound in the North of Europe, of Asia and of America; but they exist also in Malaya, and one Australian species is known. From the tropic of Capricorn they ascend in Europe to Norway and the Aland Isles.

USES.[1]—The *Euonymeæ* are often rich in bittter and astringent properties, frequently united with acrid substances, purgative or emetic, sometimes slightly stimulant. *Celastrus* in particular often contains plants active or suspected. The bark of *C. scandens*[1] has long been known in North America as emetic, evacuant, narcotic. The root of *C. senegalensis*,[2] used as a gentle purgative, is, at the same time, bitter and, we are assured, astringent (?), and is employed against chronic diarrhœa. At the Cape there is a species of the same genus bearing the name *C. venenatus*.[3] It is likewise dangerous for the severe or poisoned wounds caused by its spines. In India an oil extracted from the seeds of *C. paniculatus*[4] is used in the treatment of *beriberi*. *C. Orixa*[5] of Japan is enumerated among the medicinal plants of that country; and in Peru, Ruiz and Pavon have notified *C. macrocarpus*[6] as producing savoury alimentary buds and an edible oil extracted from the seeds. *C. verticillatus*[7] of the same authors also bears oleaginous seeds in Peru. *Maytenus* or *C. Boaria*[8] is an energetic evacuant. From its leaves and branches is prepared a decoction applied to burns caused by contact with *Rhus caustica*.[9] Its seeds, like those of *C. macrocarpus*, furnish an edible oil. Many species of *Euonymus* have analogous properties. *E. europæus*[10] (fig. 6, 7), *latifolius*,[11] *verrucosus*[12] (fig. 1–5), European species, and *E. americanus*,[13] *obovatus*,[14] and *atropurpureus*,[15] species from the United States, are mentioned as evacuants. They are considered dangerous for small cattle. Their seeds produce nausea and vomiting; formerly an ointment was prepared from them to destroy lice. The bark of *E. atropurpureus* is highly drastic; it is prescribed in America as antisyphilitic. From the fruit of *E. europæus* an insecticide powder is made, employed locally against moth, to cure scab in horses, to cicatrise obstinate gangrenous ulcers, to expel tapeworm, etc. In India, the bark of *E. tingens* Wall. is used for treating affections of the eyes. The *Elæodendra* are sometimes astringent; at the Cape, *E. croceum*[1] is employed against the bites of serpents; and in India *E. Roxburghii*[2] against wounds and burns. The drupaceous fruits of many species are alimentary; especially that of *E. sphærophyllum*,[3] a Cape species. The berries of *Salacia* are also sometimes edible; in Brazil are eaten those of *S. elliptica*, *grandifolia*, *sylvestris*, *glomerata*,[4] which are sweet and succulent in the interior; in India, those of *S. viridiflora* Wight and *Roxburghii* Wall.; in tropical Western Africa, those of *S. senegalensis*[5] and of *S. piriformis*,[6] as large as a pear, aromatic and sweet. In *Hippocratea*, designated by our colonists under the name of *Béjugues* or *Bejucos*, it is oftener the seed that is nutritious, as in *H. comosa*[7] in the Antilles, and *H. Grahami* Wight in India. *H. obcordata*[8] is employed as an expectorant in Columbia, and *H. velutina*[9] is administered for fever and headache at Sierra Leone. The *Rhacomas* are diuretic, to which property they owe the name *Myginda;* the best known are the *R. Uragoga*[10] and *Crossopetalum*,[11] of Central America. *Goupia glabra* Aubl. (fig. 12) is astringent, and is sometimes prescribed in cases of inflammation and ophthalmia. *Catha edulis*[12] is a vegetable which, with *Cocoa* and *Maté*, has been compared to tea as a domestic medicine. It appears to be a stimulant which, according to FORSKHAL, the Arabs use to dispel sleep. They chew the green leaves, and can then, without fatigue, pass the whole night without sleep. Some travellers, however, say that these fresh leaves are poisonous. Others make it an antidote against the plague. Where this plant is cultivated, they think the plague cannot make victims. Hence, doubtless, the veneration inspired in Yeman by the name of the Sheik ABOU-ZERBIN, who there introduced *Catha.*[1] They go so far as to think that by carrying a packet of these leaves about the person, they can frequent pestiferous places with impunity. The study of the pretended virtues of *Khât*[2] would probably be full of interest. There is indeed another plant of this family which was, not long since, in Europe itself, an object of much greater infatuation. It is the common *Box*[3] (fig. 28–34). Who would believe at the present day that the emperor JOSEPH II. gave a quack 1500 florins to make public a recipe which performed a miracle in the treatment of intermittent fevers, and which was nothing but an alcoholic tincture of *Box*? This appears very analogous to *Gaiac* as a sudorific, and, consequently, an anti-rheumatic and anti-syphilitic. In too large a dose it is purgative and emetic, exactly like *Euonymus.* It is in fine a very suspicious, dangerous plant, and it is very wrong to substitute it for Grenadier (*Punica granatum*) as a vermicide, for Senna as a purgative, and especially for Hop in making beer. The active principle of *Box*, said to be volatile, disappears in the dry wood and in the leaves when subjected to the action of fire.[4] By distillation over an open fire, it passes as an empyreumatic and fetid oil formerly extolled as an antidote for rheumatism and epilepsy. The *Box* is one of those plants to which a thousand properties have been attributed: of curing toothache, reddening the hair, etc. The *Box of Mahon*[5] has the same properties. In the Balearic Isles it is considered poisonous, and cases are cited of poisoning by honey collected from its flowers. As an industrial and economic plant, the *Box* has always been celebrated. It is thought that the Romans introduced it among the Gauls. They have used it continually to decorate their gardens. Cut in a thousand forms,

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[1] ENDL. *Enchirid.* 575, 577, 593.—LINDL. *Fl. Med.* (1838), 197; *Veg. Kingd.* 584, 587.—ROSENTH. *Synops. Plant. Diaphor.* 791, 1153.

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[1] L. *Spec.* 285.—Schkhur, *Handb.* i. t. 47.—DC. *Prodr.* ii. 6, n. 15.—*Evonymus scandens* Mœnch (*Bourreau des Arbres*).

[2] Lamk. *Dict.* i. 661. — Guillem. et Perr, *Fl. Sen. Tent.* i. 143.—*C. phyllacanthus* Lhér. *Sert.* 6, n. 28.—*C. decolor* Del. *Cent. pl. Afr.* 100, t. 3, fig. 6 (*Dek. Suatt, Ghenondek*).

[3] Var. (Harv. and Sond, *Fl. cap.* i. 459) du *C. buxifolius* L.—*Catha venenata* Presl.

[4] W. *Spec.* i. 1125.—Roxb. *Fl. Ind.* i. 621.—Royle, *Ill. Himal.* 167.—Lindl. *Fl. Med.* 198. —*C. nutans* Roxb. *loc. cit.* 623.—*C. Rothianus* DC. *Prodr.* n. 44.

[5] *Orixa* Thunb, *Fl. Jap.* 3.

[6] *Fl. Per.* iii. 8, t. 230, fig. 16.—DC. *Prodr.* ii. 6, n. 12.—*Hænkea multiflora* R. et Pav. *Syst.* 65.

[7] R. et Pav. *Fl. Per.* iii. 6, t. 229, fig. B.—*Maytenus verticillatus* DC. *Prodr.* ii. 10, n. 4.

[8] *C. Maytenus* W. *Spec.* i. 1127.—*Senacia Maytenus* Lamk. *Ill.* n. 2712. — *Maytenus Boaria* Mol. *Chil.* 152.—Desr. *Dict.* Suppl. iv. 2.—*M. Chilensis* DC. *Prodr.* n. 3.—Lindl. *Bot. Reg.* t. 1702; *Fl. Med.* 198.—*Maiten* Feuill. *Obs.* iii. 39, t. 27. In Brazil the leaves are equally used as a febrifuge (Reiss. *Mart. Fl. Bras. Celastr.* 10).

[9] According to Feuillée, even the shadow causes swellings which disfigure a man. In these accidents the branches of *Maytenus* are put in infusion, boiled, and the body washed with the decoction is speedily restored to its natural condition.

[10] L. *Spec.* 286, α. — DC *Fl. Fr.* iv. 620; *Prodr.* ii. 4, n. 1.—Gren. et Godr. *Fl. de Fr.* i. 331.—Mér. et Del. *Dict. Mat. Méd.* iii. 294.—Rosenth. *op. cit.* 791.—Cazin, *Pl. Méd. Indig.* éd. 3, 460 (*Bonnet-de-prêtre, Garais, Bois Carré B. à Lardoires*).

[11] Scop. *Fl. Carniol.* i. 165.—Jacq. *Fl. Austr.* t. 289.—Duham. *Arbr.* éd. nouv. 3, t. 7.—DC. *Prodr.* n. 3.—Gren. et Godr. *loc. cit.* 332.—*E. Europæus* β L.

[12] Scop. *Fl. carniol.* ed. 2, n. 268.—Jacq. *loc. cit.* t. 49.—Duham. *loc. cit.* t. 8 (*Fusain lépreux*).

[13] L. *Spec.* 286.—Duham. *loc. cit.* t. 9.—A. Gray, *Man.* ed. 5, 116.—*E. sempervirens* Marsh, *Arbr. Amer.* n. 3.

[14] Nutt. *Gen.* i. 155.

[15] Jacq. *Hort. Vindob.* ii. t. 120.—Turp. *Dict. Sc. Nat.* Atl. t. 272.—*E. carolinensis* Marsh, *op. cit.* n. 1.

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[1] DC. *Prodr.* ii. n. 6.—Harv. and Sond. *Fl. Cap.* i. 468.—*Ilex crocea* Thunb.—*Rhamnus Capensis* Spreng.—*Crocoxylum excelsum* Eckl. et Zeyh. (*Saffranhout*).

[2] Wight et Arn. *Prodr.* i. 157. — Lindl. *Fl. Med.* 107.—*Nerecja dichotoma* Roxb.

[3] *Mystroxylon sphærophyllum* Eckl. et Zeyh. —Harv. and Sond. *Fl. Cap.* i. 470.—*M. Kubu* Eckl. et Zeyh.

[4] Mart. ex Rosenth. *p. cit.* 796. In Brazil these fruits have the vernacular name of *Sapata*.

[5] DC. *Prodr.* i. 570.—Guillem et Perr. *Fl. Sen. Tent.* i. 113, t. 27.—*S. Affinis* Hook. f. *Niger*, 281 (*Kebett* des Nègres).

[6] Walp. *Rep.* i. 402.—Oliv. *Fl. Trop. Afr.* i. 374.—*Calypso pyriformis* Don, *Gard. Dict.* i. 629.

[7] Sw. *Fl. Ind. Occ.* i. 77.—DC. *Prodr.* i. 568, n. 12 (*Amandier des Bois*).

[8] Lamk. *Ill.* i. 100, t. 28, fig. 1.—*H. scandens*, Jacq. *Amer.* 9, t. 9.

[9] Afzel. ex Spreng. *N. Entd.* iii. 234.—Oliv. *Fl. Trop. Afr.* i. 370.

[10] *Myginda Uragoga* Jacq. *Amer.* t. 16.—Lamk. *Ill.* t. 76.—DC. *Prodr.* ii. 12, n. 3.—*Crossopetalum* P. Br. *Jam.* t. 17, fig. 1.

[11] L. *Spec.* 169 (part.).—*Maginda Rhacom* Sw. *Fl. Ind. Occ.* 348.—DC. *Prodr.* n. 8.

[12] See p. 10, note 2.

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[1] See ROSENTH. *op. cit.* 792.—H. BN. *Dict. Encycl. Sc. Méd.* xiii. 302.

[2] *Kât. Tchai* at Choa.

[3] *Buxus sempervirens* L. *Spec.* 983.—GREN. et GODR. *Fl. de Fr.* iii. 101.—GUIB. *Drog. simpl.* ed. 6, ii. 369.—H. BN. *Monogr. Buxac.* 41, 59, t. 1, 2; *Dict. Encycl. Sc. Méd.* xi. 296 (*Bouis, Bois bénit, Ozanne.*

[4] *Buxine* ($C^{38}H^{22}$ AzO^{6}) has been extracted from the *Box.*

[5] *B. Balearica* W. *Spec.* viii. 337.—H. BN. *Monogr. Buxac.* 45, 62.

in edging, in walls, in the shapes of animals, in figures, and in arabesques, it has served and serves still for the ornamentation of the most celebrated parks; it will suffice to mention Pliny's villa at Tusculum, the Vatican, the Escurial, and the grounds at Versailles. The branches also figure in our religious festivals. The agriculturist formerly gathered them for manure, chiefly for the vine, and as litter for small cattle. But it is for its yellow wood, heavier than water, and but slightly combustible, with fine and close grain, that the *Box* is now most useful; it is frequently employed by cabinet and toy makers, coopers, carvers, turners, musical instrument makers, and chiefly by engravers on wood. Many other *Celastraceæ* produce wood employed in industry. Of that of the indigenous *Euonymus* a charcoal is made, used for sketching and making gunpowder; likewise that of many species of *Celastrus*, as *C. serrulatus* in Abyssinia. The yellow wood of the common *Euonymus* is used by turners; organ pipes, spindles, knitting needles, skewers, pegs for the shoemaker, and many other objects are also made of it.[1] The seminal coats of this plant are used for dyeing yellow. In many *Celastraceæ* the wood itself furnishes the dye. *Euonymus tingens* of the East Indies owes its name to this fact; it is used to tattoo the skin, and especially the face of the Hindoos. *Elæodendron croceum* furnishes the Golden Wood of the Cape, also employed in dyeing. The *Salvadoreæ* have the the same general properties as the *Celastraceæ*. The root has an acrid blistering bark. The trunk of *S. persica* [2] (fig. 16–21) has a tonic bark; its leaves are purgative. With the branches conveniently cut, the Arabs clean their teeth. The fruit is edible, having an aromatic and piquant flavour, like that of garden cress (*Lepidium sativum*). This plant appears to be the "mustard" (*Sinapis*) of Scripture, celebrated for its rapid growth. Many *Celastraceæ* are cultivated in our gardens as ornamental plants: such as *Celastrus scandens*, one of our rare open-air climbers and many species of *Euonymus*, notably *E. japonicus*, so closely resembling the *Box* in its foliage, and comprising so many and such beautiful horticultural varieties.

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[1] Among the *Celastraceæ* with wood useful for cabinet-work or making musical instruments are also mentioned, at the Cape of Good Hope, *Celastrus acuminatus* L. (*Zybast*), *l'Hartogia capensis* Thunb. (*Lepelhout, Smalblad*), *Maurocenia capensis* (*Hottentot Cherry-tree* of the English), *Pterocelastrus rostratus* Meissn. (*Witpeer*), and *P. typicus* (*Spekboom*), used for making charcoal. At Ceylon, the wood of *Kokonna Zeylanica* Thw. is used for making snuff.

[2] Garcin. *Act. Angl.* (1749).—L. *Amœn.* iii. 21.—Lamk. *Ill.* t. 81.—A. DC. *Prodr.* xvii. 28. —*S. Indica* Royle.—*Rivina paniculata* L.—*Cissas arborea* Forsk.—*Embella Grossularia* Retz (*Arak, Mesuak*).

GENERA.

I. EUONYMEÆ.

1. **Euonymus** T.—Flowers hermaphrodite regular, 4–5-merous; receptacle depressed conical or more or less concave, clothed within with a variable disk, oftener wide, broadly explanate, shortly or sometimes far produced between the petals. Sepals short, imbricate or subvalvate, open or recurved. Petals same in number longer, imbricate, rarely foveolate above, entire, dentate or more rarely fimbriate or facially cristate. Stamens alternate with petals, and equal in number; filaments subulate, generally short, often recurved at apex; anthers more or less elongated or oftener short, sub-2-dymous, introrsely or more or less extrorsely rimose. Germen more or less immersed in disk and confluent with it, 3–5-locular or finally sub-3–5-lobed; style short, stigmatose apex not incrassate or more or less capitate or lobate. Ovules in cells 1, or oftener 2, ascending, with micropyle extrorsely inferior; or descending, with micropyle introrsely superior; more rarely 4-∞, inserted in two series, oblique or transverse. Fruit capsular, angular or alate, coriaceous, sometimes echinate, loculicidally 2–5-valvate; valves septiferous in the middle. Seeds in cells 1, 2, or more rarely ∞, surrounded by a fleshy (coloured) aril; albumen fleshy; cotyledons of axile embryo broad foliaceous; radicle inferior or more rarely superior.—Erect trees or shrubs, sometimes climbing, oftener glabrous; leaves opposite petiolate (persistent), entire or crenate or dentate; stipules small, caducous; flowers in axillary pedunculate cymes, more rarely solitary. (*Europe*, *temperate and warm Asia*, *Malaya*, *Australia*, *temperate North America*). See p. 1.

2. **Pachystima** Rafin.[1]—Flowers nearly of *Euonymus*, 4-merous; receptacle somewhate concave. Sepals 4 and petals same in number alternate imbricate. Stamens 4, inserted outside and between the

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[1] *Amer. Monthl. Mag.* (1818), from A. Gray, *Pl. Fendler*, 29.—B. H. *Gen.* 361, n. 5.—*Oreophila* Nutt. *Torr. et Gr. Fl. N. Amer.* i. 258.

lobes of a thick disk; filaments free; anthers introrse; connective rather thick. Germen immersed in base of disk, attenuated to a capitate style with stigmatic apex; cells 2, incomplete alternipetalous. Ovules in each cell 2, ascending; micropyle extrorsely inferior. Fruit capsular oblong, loculicidally 2-valvate, tardily dehiscent. Seeds oblong, enclosed in membranous multifid aril;[1] albumen fleshy; cotyledons of straight embryo[2] oblong.—A glabrous under-shrub; leaves opposite, very shortly petiolate, minutely stipulate, entire or serrate; flowers in axillary cymes.[3] (*North-western mountainous America.*[4])

3. **Catha** Forsk.[5]—Flowers nearly of *Euonymus*, 5-merous; receptacle shortly concave. Calyx short 5-lobed, imbricate. Petals 5, longer erect, imbricate, finally opening at apex. Stamens 5, alternipetalous, exterior to cupular disk; filaments subulate erect; anthers short sub-2-dymis, introrsely 2-rimose. Germen free, 3-locular; style short, apex shortly 3-lobed stigmatic; ovules in cells 2, ascending; micropyle extrorsely inferior. Fruit capsular, linear-oblong or subclavate, obtusely 3-gonal, loculicidally 3-valved; septa thickened in the middle. Seeds[6] 1–3, elongate, produced below to a thin (arillate ?) membranous unequally 3-angular wing; testa crustaceous slightly punctulate-rugose; albumen fleshy; cotyledons of (green) axile embryo foliaceous elliptic; radicle rather long inferior. —A glabrous shrub; leaves oftener opposite oblong-lanceolate coriaceous, serrate or subentire; stipules minute ciliolate; flowers in axillary short dichotomous ramose cymes. (*Arabia, warm Eastern and Southern Africa.*[7])

4. **Microtropis** Wall.[8]—Flowers hermaphrodite or polygamous; receptacle cupular. Sepals 5, unequal, much imbricate, persistent. Petals 5, the alternate longer, imbricate, slightly fleshy or subcoria-

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[1] White.

[2] Green.

[3] A genus distinguished from *Euonymous* only by the forms of its floral parts and fruit, and by its incompletely 2-celled germen.

[4] Spec. 1. *P. myrsinites* Rafin.—Wats. *Expl. Fort. Parall. Bot.* 50.—*Myginda myrtifolia* Nutt.—Hook. *Fl. Bor.-Amer.* i. 120, t. 41.—*Oreophila myrtifolia* Nutt. *Gen. Pl.* i. 100.—Walp. *Rep.* i. 538. *P. Canbyi* A. Gray (*Am. Journ. Sc.* (1874), 442, is another species recently unknown to us.

[5] *Fl. Æg.-Arab.* 63 (not of others).—Endl. *Gen.* n. 5678 (part.).—B. H. *Gen.* 361, n. 4.—H. Bn. *Payer Fam. Nat.* 324.—*Methyscophyllum* Eckl. et Zeyh. *Enum.* 152.—*Trigonotheca* Hochst. *Flora* (1841), 662.

[6] Nearly of *Hippocratea* (or *Canotia*).

[7] Spec. 1. *C. edulis* Fotsk. *loc. cit.*—A. Rich. *Fl. Abyss. Tent.* i. t. 30.—*Celastrus edulis* Vahl, *Symb.* i. 21.—DC. *Prodr.* ii. 6, n. 25 (species of *Catha* of other authors belong to *Celastrus*).

[8] Ex Arn. *Ann. Nat. Hist.* iii. 152.—Endl. *Gen.* n. 5681.—B. H. *Gen.* 361.—Hook. *Fl. Ind.* i. 613.

ceous, coherent at base. Sometimes more rarely 0 (*Paracelastrus*[1]). Stamens 5, filaments at base adnate to margin of receptacle, or to base of petals, otherwise free; anthers introrse ovate rather large, 2-rimose. Germen at base adnate to concavity of receptacle, incompletely 2–3-locular, style thick, apex stigmatic, minutely 2–3-lobed. Ovules in cells 2, collaterally ascending suberect; micropyle extrorsely inferior. Fruit capsular oblong, surrounded at base by the perianth, tardily dehiscent, 2-3-valvate. Seed 1, stipitate oblong, exterior soft or fleshy;[2] albumen dense fleshy; cotyledous of straight embryo foliaceous.—Glabrous trees or shrubs; leaves[3] opposite petiolate entire coriaceous thick, persistent; flowers[4] in axillary cymes or glomerules. (*East Indies.*[5])

5. **Kokoona** Thw.[6]—Flowers hermaphrodite; calyx cupular shortly lobate crenate or subentire. Petals 5, longer, thick coriaceous glandular-punctate, imbricate or contorted. Stamens 5, alternipetalous; filaments free short, at base thickly subulate and inserted in as many hollows of a thick obtusely 5-angled hypogynous disk; anthers thick ovate-acute or oblong introrse, 2-rimose. Germen immersed in base of disk, 3-locular; style short thick, apex shortly 3-lobed stigmatic. Ovules in cells ∞, imbricate in 2-series, obliquely ascending. Capsule (large) subligneous thick oblong, 3-gonal, loculicidally 3-valvate; valves inwardly septiferous. Seeds ∞, imbricate, produced either above or on both sides to a wide wing; testa of basilar or medial nucleus coriaceous; cotyledons of exalbuminous embryo flat obovately cuneate or depressed 3-angular;[7] radicle inferior,[8] or (with 2-alate seeds and 3-angular cotyledons), ventral and horizontal very short. Glabrous wide-spreading branched trees; leaves opposite petiolate, entire or obscurely crenate, coriaceous, sometimes punctate beneath; stipules small, caducous; flowers[9] in axillary pedunculate compound cymes; pedicels 2-bracteate. (*Borneo, Ceylon.*[10])

6? **Alzatea** R. et Pav.[11]—"Flowers hermaphrodite apetalous,

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[1] Miq. *Fl. Ind.-Bat.* i. p. ii. 590.

[2] Testa red or dusky.

[3] Nearly of *Clusiaceæ* or *Rhizophoreæ*.

[4] Small white, sometimes recalling those of some *Ilicineæ*, the petals for instance being oftener free.

[5] Spec. 7, 8. Wight, *Icon.* t. 761, 976, 977, 1052.—Thw. *Enum. Pl. Zeyl.* 71.—Walp. *Rep.* i. 534; *Ann.* i. 191; vii. 575.

[6] *Hook. Kew Journ.* v. 379; *Enum. Pl. Zeyl.* 52.—B. H. *Gen.* 362, n. 8.—Hook. *Fl. Ind.* i. 616.—*Trigonocarpus* Wall. *Cat.* n. 6520 (not Velloz. whose is a species of *Cupania*.

[7] In a Bornean species (herb. *Beccari*).

[8] In a Ceylon species.

[9] For the Order rather large (recalling those of *Hippocratea*); petals bright yellow.

[10] Spec. 2. Walp. *Ann.* iv. 368.

[11] *Prodr.* 40, t. 7; *Fl. Per et Chil.* iii. 20, t. 241, fig. *a.*—DC. *Prodr.* ii. 10 ("apparently allied to *Maytenus*").—Endl. *Gen.* n. 5698.—B. H. *Gen.* 362, n. 9.

5-merous; calyx campanulate, 5-fid. Stamens 5, alternate with sepals; filaments short free; anthers subcordate. Germen free subcordate; style short, apex stigmatic obtuse; cells 2, ∞-ovulate. Capsule obcordate, loculicidally 2-valvate; valves septiferous in the middle; the intermediate septa forming the dissepiment. Seeds ∞, winged, attached on both sides perpendicular to dissepiment, superposed in duplex order from the base to the apex.—A glabrous tree; branches[1] verticillate; leaves opposite and verticillate petiolate wide obovate entire coriaceous; flowers[2] in terminal many-flowered corymbs.[3]" (*Peru.*[4])

7. **Elæodendron** JACQ. F[5].—Flowers of *Euonymus;* germen 2–5-locular. Ovules in cells 2, ascending. Fruit drupaceous; flesh sometimes scanty; cells of hard putamen 1–3, 1- or more rarely 2-spermous. Seeds exarillate; testa thinly membranous or slightly fleshy; cotyledons of thickly or scantily albuminous embryo flat.—Small trees or shrubs; leaves (oftener persistent) opposite or more rarely alternate, entire or crenate; stipules minute, caducous; cymose inflorescence[6] and other characters of *Euonymus.* (*Asia, Malaya, Oceania, and tropical South America.*[7])

8. **Maurocenia** MILL.[8]—Flowers nearly of *Elæodendron* (or *Euonymus*) 5–6-merous; stamens exserted. Anthers widely oblong laterally extrorse. Germen oftener 3-locular, free from short disk; ovules in cells 2, collaterally descending; micropyle introrsely superior. Fruit baccate;[9] mesocarp finally spongy. Seeds 1- or

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[1] Purplish.

[2] Yellowish.

[3] A very uncertain genus. Query if of this Order? (Perhaps of *Saxifragaceæ ?*)

[4] Spec. 1. *A. verticillata* R. et PAV. *loc. cit.*

[5] In *Act. Helvet.* i. 36.—J. *Gen.* 452 (*Elæodendrum*).—GÆRTN. *Fruct.* i. 274, t. 57.—LAMK. *Dict.* iv. 537; *Ill.* t. 132.—DC. *Prodr.* ii. 10 (part.).—ENDL. *Gen.* n. 5688.—B. H. *Gen.* 367, n. 28.—H. BN. *Payer Fam. Nat.* 325.—HOOK. *Fl. Ind.* i. 623.—BAKER, *Fl. Maurit.* 49.—*Schrebera* RETZ. *Obs.* vi. 25, fig. 3.—*Rubentia* COMMERS. ex J. *Gen.* 378.—*Portenschlagia* TRATTIN. *Arch.* 250.—*Neerija* ROXB. *Fl. Ind.* i. 646.—*Mystroxylon* ECKL. et ZEYH. *Enum.* 125.—*Crocoxylon* ECKL. et ZEYH. *loc. cit.* 128.—*Lamarckia* Hortul. (ex ENDL.).

[6] Flowers white or greenish.

[7] Spec. about 35 VENT. *Jard. Malm.* t. 117.—WIGHT and ARN. *Prodr.* i. 157.—WIGHT, *Ill.* t. 71.—GRISEB. *Fl. Brit. W.-Ind.* 145.—HARV. and SOND. *Fl. Cap.* i. 465 (*Cassine*), 467, 469 (*Mystroxylon*).—TUL. *Ann. Sc. Nat,* sér. 4, viii. 106 (*Mystroxylon*), 107.—BENTH. *Fl. Austral.* i. 402.—OLIV. *Fl. Trop. Afr.* i. 365.—REISS. *Mart. Fl. Bras. Celastr.* 32, t. 5.—H. BN. *Adansonia,* xi. 267.—WALP. *Rep.* i. 536, 539 (*Cassine*); v. 402 403 (*Cassine*); *Ann.* i. 191; ii. 264; vii. 577 (*Cassine*), 581.

[8] *Dict.* x L. *Gen.* (ed. 1737), n. 244.—*Cassine* MILL. ex. L. *Gen.* (ed. ead), n. 845 (nec. *alior.*).—J. *Gen.* 378.—GÆRTN. *Fruct.* ii. 72, t. 92.—LAMK. *Dict.* i. 651; Suppl. ii. 130; *Ill.* t. 130.—DC. *Prodr.* ii. 11.—B. H. *Gen.* 363, n. 12.—H. BN. *Payer Fam. Nat.* 325.

[9] Ovoid or globular; epicarp reddish, finally dark violet; mesocarp white. Said to be generally drupaceous.

few descending exarillate; albumen fleshy; cotyledons of thick (green) embryo ovate or subelliptic.—A glabrous shrub; leaves opposite or rarely alternate, petiolate entire coriaceous, flowers[1] in axillary 2-chotomous ramose cymes.[2] (*South Africa.*[3])

9. **Hartogia** Thunb.[4]—Flowers (nearly of *Euonymus*) 4–5 merous; receptacle slightly concave. Sepals short and petals same in number longer, imbricate. Stamens 4, 5, alternipetalous, alternate with an equal number of squamiform lobes of disk; filaments subulate; anthers short, 2-rimose, finally extrorse. Germen basally imbedded in disk, afterwards free, pyramidal, attenuated to a short style stigmatic obtuse at apex; cells incomplete 2, or more rarely 3; ovules in each 2, ascending; micropyle extrorsely inferior. Fruit subelliptic, dry, indehiscent; seeds 1, 2, exarillate; testa nitid; cotyledons of exalbuminous embryo subfoliaceous.—A glabrous shrub; leaves opposite petiolate serrate or crenulate coriaceous; flowers [5] in axillary cymes.[6] (*South Africa.*[7])

10. **Rhacoma** L.[8] — Flowers nearly of *Elæodendron*, smaller (sometimes 1-sexual) 4–5-merous; sepals and petals longer imbricate. Stamens 4, 5, alternate with lobes of disk bordering cupuliform receptacle; anthers short introrse. Base of germen imbedded in receptacle; cells 2–4, oftener incomplete; lobes of style same in number short stigmatic. Ovules in cells solitary subbasilar ascending; micropyle extrorsely inferior. Fruit oftener unequally obovoid, dry or drupaceous; flesh scanty; putamen 1, 2-locular; seeds arillate or exarillate albuminous. Other characters of *Elæodendron.*—Glabrous or pilose shrubs or under-shrubs [9] oftener slender;

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[1] Small, white.

[2] A genus generally referred to *Ilicineæ*, distinguished from *Elæodendron* by the direction of its ovules (a character of very small moment in *Euonymus*) and by the nature of its pericarp.

[3] Spec. 1. *M. capensis* Harv. and Sond. *Fl. Cap.* i. 465.—Walp. *Ann.* vii. 577.—*Frangula sempervirens*... Dill. *Elth.* 146, t. 121, fig. 147.—*Cassine Maurocenia* L. *Spec.* 385.—Thunb. *Fl. Cap.* 268.—Hook. *Icon.* t. 552.

[4] *Diss. Nov. Gen.* v. 35, c. ic.—L. f. *Suppl.* 128.—DC. *Prodr.* ii. 12.—Endl. *Gen.* n. 5687.—B. H. *Gen.* n. 363, n. 10.—*Schrebera* Thunb. *Nov. Act. Upsal.* i. 91, t. 5, fig. 1; *Prodr.* t. 2 (not Retz. nor Roxb. nor Th.).

[5] Small white.

[6] Perhaps *Lauridia* (Eckl. et Zeyh. *Enum.* 124;—Harv. and Sond. *Fl. Cap.* i. 462;—B. H. *Gen.* 363, n. 13), whose 4-merous flowers appear to us quite the same in form, belongs to this genus.

[7] Spec. 1. *H. Capensis* Thunb. *loc. cit.*—Harv. and Sond. *Fl. Cap.* i. 464.—*H. capensis* Eckl. et Zeyh.—*H. multiflora* Eckl. et Zeyh. *H. riparia* Eckl. et Zeyh.—*Schrebera schinoidea* Thunb.

[8] *Gen.* n. 144.—*Crossopetalum* P. Br. *Jam.* 145, t. 17, fig. 1 (not Roth).—*Myginda* L. *Gen.* n. 178.—Jacq. *Stirp. Amer.* 24, t. 16; *Ic. Rar.* t. 311.—J. *Gen.* 378.—Lamk. *Ill.* t. 76.—Poir. *Dict.* iv. 395; Suppl. iv. 41.—DC. *Prodr.* ii. 12 (part.).—Endl. *Gen.* n. 5689.—B. H. *Gen.* 366, n. 24.

[9] Sometimes of a reddish appearance.

leaves opposite or sometimes verticillate or alternate, stipules minute; flowers (minute) in slender stipitate (sometimes few-flowered) cymes. (*Central America, Mexico, Chili,*[1] *Madagascar?*)

11. **Ptelidium** Dup.-Th.[2] — Flowers of *Euonymus*, 4-merous; receptacle depressed. Calyx 4-partite; folioles decussate, imbricate. Petals 4, oblong sessile, imbricate. Stamens 4, alternipetalous, interior to a short disk and alternate with its lobes; filaments short subulate, recurved at apex; anthers small subglobose, extrorsely 2-rimose Germen compressed ovate, 2-locular and with short style not thickened at apex. Ovules in cells 2, inserted a little above the base ascending; micropyle extrorsely inferior. Fruit dry, thickly samaroid oval-subcordate, much compressed, produced at margin to a thick venose coriaceous wing,[3] indehiscent, 1–2-locular. Seed ascending linear-oblong; "albumen fleshy thin; cotyledons of embryo (green) flat foliaceous; radicle inferior."—A glabrous shrub; leaves opposite petiolate coriaceous entire; flowers in axillary terminal and ramose cymes. (*Madagascar.*[4])

12. **Zinowiewia** Turcz.[5]—Flowers 5-merous (of *Elæodendron* or *Euonymus*); receptacle cupular. Sepals and petals 5, longer imbricate. Stamens 5, exterior to 5-angular disk; anthers short introrse. Base of germen imbedded in cavity of receptacle, 2-locular; ovules in cells 2, collaterally suberect; micropyle extrorsely superior. Fruit samaroidal,[6] stipate at base with unenlarged calyx, dry, 1-locular, dilated above to an unequal dolabriform, sometimes rather lateral membranous wing, otherwise dry indehiscent; seed suberect cylindrical glabrous exarillate; embryo ... ?—A glabrous bush; leaves opposite entire (of *Elæodendron*); flowers[7] in axillary deeply 2-chotomous ramose cymes.[8] (*Mountainous Mexico.*[9])

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[1] Spec. 7, 8. Sw. *Fl. Ind. Occ.* i. 340 (*Myginda*). —H. B. K. *Nov. Gen. et Spec.* vii. 66 (part.), t. 620.—C. Gay, *Fl. Chil.* ii. 9 (*Myginda*).—Griseb. *Fl. Brit. W.-Ind.* 146 (*Myginda*). —Chapm. *Fl. S. Unit. St.* 75 (*Myginda*).—Walp. *Rep.* v. 402 (*Myginda*); *Ann.* i. 191; vii. 585 (*Myginda*).

[2] *Gen. Nov. Madag.* 24; *Hist. Vég. Iles Afr. Austr.* 25, t. 4.—Lamk. *Ill.* t. 916.—Poir. *Dict.* Suppl. iv. 597.—DC. *Prodr.* ii. 11.—Endl. *Gen.* n. 5683.—B. H. *Gen.* 363, n. 11.—*Petalocarpum* Dup.-Th. Herb. Juss. (ex Tul.). — *Seringia* Spreng. *Syst.* i. 441 (nec J. Gay).

[3] Wing sometimes obsolete.

[4] Spec. 1. *P. ovatum* Poir. *loc. cit.*—Tul. *Ann. Sc. Nat.* sér. 4, viii. 103.—*Seringia ovata* Spreng.

[5] *Bull. Mosc.* (1859), i. 275.—B. H. *Gen.* 364, n. 15.

[6] Nearly of *Securidacæ* the smaller sometimes recalling the legumen of *Nissolia*.

[7] Small crowded green.

[8] A genus distinguished from the oppositifolious *Elæodendra* only by its alate fruit.

[9] Spec. 1. *Z. integerrima* Turcz. – Walp. *Ann.* vii. 577.— *Wimmeria? integerrima* Turcz. *Bull. Mosc.* (1858).

13. **Pleurostylia** WIGHT AND ARN.[1]—Flowers 4, 5-merous; sepals[2] imbricate. Petals longer imbricate. Stamens 5 alternipetalous; filaments interior to lobe of disk and alternate with them; anthers subbasifixed, introrse; connective incrassately dilated at back (dark). Germen free, immersed at base in cavity of receptacle; style short, apex stigmatic 3-gonal or unequally dilated; cell in germen 1, eccentric; ovules in cell 2, ascending; raphe dorsal. Fruit slightly fleshy, finally dry, marked with eccentric scar of style. Seeds 1 or more rarely 2; testa coriaceous, externally clothed with pulp (aril ?); albumen copious; cotyledons of rather large embryo wide suborbiculate.—A glabrous shrub; leaves opposite entire coriaceous; flowers[3] in axillary cymes. (*East Indies*, *New Caledonia*, *Malacca*.[4])

14. **Cathastrum** TURCZ.[5]—Flowers nearly of *Pleurostylia*; sepals and petals 5, imbricate. Stamens 5, exterior to thin 5-gonal disk; anthers short introrse. Germen free oblique; style short, apex stigmatic subpeltate; ovules in eccentric cell ∞ (6–8), inserted in 2 series in parietal placenta, ascending. Fruit . . . ?—A glabrous shrub; leaves opposite oblong, entire or undulate; stipules minute, flowers in axillary or subterminal compound ramose corymbiform cymes; pedicels articulate at base, 2-bracteolate. (*South Africa*.[6])

15. **Celastrus** L.[7]—Flowers (nearly of *Euonymus*) hermaphrodite or 1-sexual; receptacle very various in form, shortly convex, subplane or more or less concave cupular or suburceolate. Disk very various in form, lining the receptacle, or flattened, 4–5-lobed (*Gymnosporia*,[8]) or thick cupular sinuate-lobed (*Denhamia*,[9]) or more or less concave, obconical or urceolate. Sepals 4, 5 and petals same in number alternate, longer, inserted at margin of receptacle, more or less peri-

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[1] *Prodr.* i. 157.—ENDL. *Gen.* n. 5686.—B. H. *Gen.* 363, n. 14.—H. BN. *Payer Fam. Nat.* 325.—HOOK. *Fl. Ind.* i. 617.—BAKER, *Fl. Maurit.* 49.

[2] Minutely glandular.

[3] Small and few, white.

[4] Spec. about 2. WIGHT, *Icon.* t. 155.—TUL. *Ann. Sc. Nat.* sér. 4, viii. 104 (*Pleurostylia*).—WALP. *Rep.* i. 536; *Ann.* vii. 577.

[5] *Bull. Mosc.* (1858), ii. 448.—B. H. *Gen.* 362, n. 7.

[6] Spec. 1. *C. capense* TURCZ.—HARV. and SOND. *Fl. Cap.* i. 527.—WALP. *Ann.* vii. 576.

[7] *Gen.* n. 270.—J. *Gen.* 378.—GÆRTN. *Fruct.* i. t. 95.—LAMK. *Dict.* i. 660; Suppl. ii. 143; *Ill* t. 130.—DC. *Prodr.* ii. 5.—SPACH. *Suit. à Buffon*, ii. 410.—ENDL. *Gen.* n. 5679.—PAYER, *Organog.* 167, t. 36.—A. GRAY, *Gen. Ill.* t. 170.—B. H. *Gen.* 364, 977, n. 16.—HOOK. *Fl. Ind.* i. 617.—BAKER *Fl. Maurit.* 50.—H. BN. *Payer Fam. Nat.* 324 (incl.: *Denhamia* MEISSN. *Gymnosporia* WIGHT and ARN. *Maytenus* FEUILL. *Putterlickia* ENDL.).

[8] WIGHT and ARN. *Prodr.* i. 159.—B. H. *Gen.* 365, n. 18; HOOK. *Fl. Ind.* i. 618.—*Catha* ENDL. *Gen.* n. 5678. (not FORSK.)—*Encentrus* PRESL, *Bot. Bem.* 33.—*Polyanthus* PRESL, *loc. cit.*

[9] MEISSN. *Gen.* 18; *Comm.* 16.—ENDL. *Gen.* n. 5065.—B. H. *Gen.* 366, 997, n. 23.—*Leucocarpon* A. RICH. *Voy. Astrol. Bot.* 46, t. 46.—? *Hedraianthera* F. MUELL. *Fragm.* v. 58.

gynous, imbricate. Stamens 4, 5, alternipetalous, inserted in hollows of disk; filaments free or connate at base, subulate, sometimes very short (*Hedraianthera*); anthers subglobular, ovate cordate or oblong, introrsely rimose. Germen situate at bottom of disk (*Eucelastrus*[1]) or more or less deeply confluent with it (*Gymnosporia*); cells 2–4; style more or less elongate, apex stigmatic more or less deeply 2–4-lobed. Ovules in cells 1[2] (*Maytenus*[3]), 2, ascending with micropyle extrorsely inferior, or sometimes 3-∞, 2-seriate, oblique or transverse (*Putterlickia*,[4] *Denhamia*[5]). Capsule various in form, sometimes rather fleshy (*Scytophyllum*[6]), thick osseous (*Denhamia Hedraianthera*) or broad submembranous (*Putterlickia*), loculicidally 2–4 valved; seeds 1-∞, protected by a more or less developed fleshy aril,[7] albuminous or more rarely (*Maytenus*) exalbuminous.—Small trees or shrubs; oftener glabrous; sometimes spinose (*Putterlickia, Gymnosporia*) and glaucesent, sometimes climbing (*Eucelastrus*); leaves alternate or fasciculate, entire or serrate; stipules 0 or consisting of a few hairs; flowers[8] in cymes (*Putterlickia, Gymnosporia*) or more rarely in compound or cymiferous (*Eucelastrus, Denhamia*) terminal or axillary racemes. (*All warm and temperate regions.*[9])

16. **Schæfferia** Jacq.[10]—Flowers diœcious, 4-merous; sepals and petals longer obtuse, imbricate. Stamens 4, exterior to generally small disk. Germen (in male flower effete) free ovoid; style short, presently divided into 2-partite stigmatic lobes; cells 2, 1-ovulate;

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[1] *Celastrus* B. H. *loc. cit.*—*Orixa* Thunb. *Fl. Jap.* 3 (ex Miq.).

[2] In some species of *Maytenus* certainly 2.

[3] Feuill. ex J. *Gen.* 449.—Mol. *Chil.* 177.—Lamk. *Dict.* iv. 2.—DC. *Prodr.* ii. 9.—Endl. *Gen.* n. 5860.—Payer, *Organog.* 169, t. 36.—B. H. *Gen.* 364, 998, n. 17.—*Hænkea* R. et Pav. *Prodr.* 36, t. 6 (nec Salisb.). — *Monteverdia* Rich. *Cub.* i. 346.—? *Moya* Griseb. *Pl. Lorenz.* 63, fig. 3.—*Maiten* Feuill. *Obs.* iii. 39, t. 27.—*Boaria* (Mol. DC. *Prodr.* iii. 299) syn. of *Maytenus*.

[4] Endl. *Gen.* n. 5674.—Payer, *Organog.* 169.—B. H. *Gen.* 366, n. 22.

[5] In *D. pittosporoide* F. Muell. we have oftener seen 2 ovules in each cell.

[6] Eckl. et Zeyh. *Enum.* 124.—Endl. *Gen.* n. 5688.

Red or yellow, very rarely 0.

White, golden or greenish.

Spec. 130, R. et Pav. *Fl. Per. et Chil.* t. 229.—H. B. K. *Nov. Gen. et Spec.* vii. 64, not.—Wight, *Ill.* t. 72; *Ic.* t. 158, 382 (*Gymnosporia*).—Bl. *Bijdr.* 1144.—Hook. *Icon.* t. 587 (*Maytenus*).—Guillem. et Perr. *Fl. Sen. Tent.* i. t. 36.—Webb, *Phyt. Canar.* t. 69 B (*Catha*).—Harv. and Sond. *Fl. Cap.* i. 452, 465 (*Cassine*), 471 (*Scytophyllum*).—Oliv. *Fl. Trop. Afr.* i. 360.—A. Gray, *Amer. Expl. Exp. Bot.* i. t. 23.—Griseb. *Fl. Brit. W.-Ind.* 145 (*Maytenus*).—Chapm. *Fl. S. Unit. St.* 76.—Boiss. *Pl. Esp.* t. 38; *Fl. Or.* ii. 10.—Benth. *Fl. Austral.* i. 398, 400 (*Gymnosporia*), 401 (*Denhamia*).—Tul. *Ann. Sc. Nat.* sér. 4, viii. 97 (*Catha*).—F. Muell. *Fragm.* v. 203 (*Leucocarpon*).—Reiss. *Mart. Fl. Bras. Celastr.* 3, t. 1–4, 6–9 (*Maytenus*).—Tr. *Ann. Sc. Nat.* sér. 5, xvi. 336 (*Maytenus*).—*Bot. Reg.* t. 1702 (*Maytenus*).—*Bot. Mag.* t. 2070, 2114.—Walp. *Rep.* i. 532; ii. 827 (*Maytenus*); v. 401; *Ann.* i. 189; ii. 263; iv. 427; v. 402; vii. 575 (*Catha*), 578, 579 (*Maytenus*), 580.

[10] *Stirp. Amer.* 259.—Lamk. *Ill.* t. 809.—Poir. *Dict.* vi. 727; Suppl. v. 83.—DC. *Prodr.* ii. 40.—Endl. *Gen.* n. 5750.—B. H. *Gen.* 367, n. 26.

micropyle of subbasilar ovule inferior, extrose or finally lateral. Fruit dry; 1–2-pyrenous. Seeds in pyrenæ solitary exarillate; cotyledons of slightly albuminous embryo foliaceous.—Glabrous rigid shrubs; leaves alternate entire coriaceous (oblong ovate or spathulate) exstipulate; flowers[1] axillary, solitary or oftener cymose or glomerulate. (*Antilles*, *New Mexico*, *Texas*.[2])

17? **Wimmeria** Schltl.[3]—Flowers nearly of *Celastrus*, 5-merous; anthers oblong introrse, 2-rimose. Germen pyramidally 3-gonal, confluent at base with thick disk, attenuated to 3-lobed style dilate stigmatic at apex. Ovules in cells ∞, inserted in 2-series in the internal angle. Fruit broadly oblong 3-alate, cordate at base, indehiscent; wings broad membranous; cell 1, 1–2-spermous. Seeds terete narrow linear; albumen fleshy; cotyledons of axile embryo flat oblong-lanceolate.—Small glabrous trees; leaves alternate petiolate exstipulate serrate coriacious; flowers in axillary cymes.[4] (*Mexico.*[5])

18. **Polycardia** J[6].—Flowers nearly of *Celastrus*, 5-merous; receptacle shortly cupular. Sepals 5, imbricate, and petals same in number longer, contorted, open. Stamens 5, exterior to thick disk adnate to receptacle; filaments subulate; anthers short introrse, 2-rimose. Germen half immersed in receptacle, 3–5-locular; style short, apex shortly lobed stigmatic; ovules in cells ∞, 2-seriate ascending; micropyle extrorsely inferior. Capsule ovoid, loculicidally 3–5-valved; septa seminiferous within. Seeds ∞, ascending elongate and girt at base with a deeply laciniate aril; embryo . . .?—Shrubs; leaves alternate articulate, entire or spinose dentate coriaceous; flowers few glomerulate, inserted either in the middle of the upper surface of the costa, or in the emarginate apex of the obcordate limb.[7] (*Madagascar*.[8])

19. **Pterocelastrus** Meissn.[9]—Sepals 5, imbricate, petals 5,

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[1] Small, white or greenish.

[2] Spec. 2. Sloane, *Jam.* ii. t. 209, fig. 1.—Sw. *Fl. Ind. Occ.* i. 327, t. 7.—Griseb. *Fl. Brit. W.-Ind.* 146.—Karst. *Fl. Columb.* i. 183, t. 91.—Chapm. *Fl. S. Unit. St.* 76.—Walp. *Ann.* iv. 428; vii. 581.

[3] *Linnæa*, vi. 427.—Endl. *Gen.* n. 5684.—B. H. *Gen.* 369, n. 34.

[4] A genus with germen like *Celastrus* (sect. *Putterlickia*) distinguished only by its fruit and seeds. Is it not a sect. of *Celastrus?*

[5] Spec. 2, 3. Hook. *Icon.* t. 356.—Walp. *Rep.* i. 536.

[6] *Gen.* 377.—Lamk. *Ill.* t. 133.—Poir. *Dict.* v. 481.—DC. *Prodr.* ii. 10.—Endl. *Gen.* n. 5677.—B. H. *Gen.* 365, n. 19.—H. Bn. *Payer Fam. Nat.* 325.—*Commersonia* Commers. (not Forst.).—*Florinda* Noronh. (ex Endl.).

[7] A genus as regards flower similar to *Euonymus* (or *Celastrus*), differing only in the nature of its capsule and seeds and in its inflorescence.

[8] Spec. 2, the flowers of 1 of which are unknown. Tul. *Ann. Sc. Nat.* sér. 3, vii. 101.—Walp. *Ann.* vii. 580.

[9] *Gen.* 68; *Comm.* 49.—Endl. *Gen.* n. 5682.—B. H. *Gen.* 365 n. 21.—*Asterocarpus* Eckl. et Zeyh. *Enum.* 122.

longer much imbricated, often finally recurved at apex. Stamens 5, alternipetalous; filaments inserted between the lobes of 5-gonal disk and exterior to them subulate; anthers short introrse. Germen immersed in base of disk, 3-gonal-pyramidal, 3-locular; style short, apex stigmatic variously 3-lobed or 3-gonal. Ovules in cells 2, ascending; micropyle extrorsely inferior. Fruit capsular submembranous or subfleshy, 3–6-alate, loculicidally 3-valved; valves inwardly septiferous in the middle; wings simple or 2-fid to apex Seeds ascending, either included in a membranous aril (*Asterocarpus*), or exarillate compressed and marginately alate (*Peripterygia*[1]); albumen fleshy; cotyledons of (green) embryo linear or elliptic; radicle rather long inferior.—Glabrous trees or shrubs; branches angular; leaves alternate coriaceous obovate; stipules very small glanduliform or 0; flowers in axillary or terminal ramose-compound often corymbiform cymes. (*South Africa New Caledonia.*[2])

20. **Kurrimia** Wall.[3]—Flowers hermaphrodite; receptacle subplane or cupular. Sepals 5, imbricate. Petals 5, longer, imbricate, open-recurved. Stamens 5, inserted with alternate petals under the margin of disk lining the receptacle; filaments subulate; anthers introrse or laterally or extrorsely dehiscent. Germen immersed within disk; cells 2, incomplete, or complete; styles 2, filiform, springing from woolly apex of germen, more or less twisted or corrugate in the bud, capitellate at stigmatic apex; ovules in cells 2, collaterally ascending subbasilar. Fruit capsular coriaceous, indehiscent or 2-valved; seeds elongate, enclosed in fleshy aril; testa smooth glossy; albumen fleshy; cotyledons of axile embryo linear-elongate. — Glabrous trees; leaves alternate petiolate entire coriaceous penninerved; veins transverse; stipules deciduous; flowers[4] in axillary and terminal racemes, simple or ramose. (*South Tropical Asia*, *Malaya.*[5])

21. **Perrottetia** H. B. K.[6]—Flowers hermaphrodite or polygamo-diœcious (nearly of *Euonymus* or *Celastrus*), 5-merous; petals valvate

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[1] H. Bn. *Adansonia*, xi. 266.

[2] Spec. 7, 8. Harv. and Sond. *Fl. Cap.* i. 461.

[3] *Cat.* n. 4334.—Arn. *Act. Acad. Nat. Cur.* xviii. 328.—B. H. *Gen.* 365, n. 20.—H. Bn. *Payer Fam. Nat.* 325.—Hook. *Fl. Ind.* i. 621.—*Bhesa* Ham. *Edinb. New Phil. Journ.* xvi. 315 (part.).—Endl. *Gen.* n. 5692.—*Pyrospermum* Miq. *Fl. Ind.-Bat.* Suppl. 402.

[4] White, "yellowish. Capsules brown. Aril white or reddish."

[5] Spec. about 3. Thw. *Enum. Pl. Zeyl.* 72.—Walp. *Rep.* i. 538 (*Bhesa*).

[6] *Nov. Gen. et Spec.* vii. 73, t. 622.—Endl. *Gen.* n. 5697.—B. H. *Gen.* 367, n. 29.—? *Theaphyllum* Nutt. (ex Turcz.).—*Caryospermum* Bl. *Mus. Lugd.-Bat.* i. 176.—B. H. *Gen.* 367, n. 27.

or slightly imbricate, 3-angular. Germen half immersed in rather thick, oftener 5-gonal disk and not confluent with it; cells 2, 2-ovulate; ovules ascending; a spurious septum more or less developed between the ovules in each cell (hence cells 4, 1-ovulate). Berry subglobose (small) slightly fleshy; seeds exarillate, externally more or less triate or costate; embryo small albuminous.—Unarmed shrubs, generally glabrous; leaves alternate petiolate subovate serrulate, sometimes glandular; stipules minute, deciduous; flowers[1] in slender axillary more or less compound cymiferous racemes. (*Both tropical Americas, tropical Oceania.*[2])

22? **Frauenhofera** Mart.[3]—Flowers nearly of *Perrottetia*, 5-merous; sepals and petals imbricate, germen 2-locular; ovules in cells 2, ascending. Fruit[4] cylindrical subsiliquiform, conical at apex; pericarp fibrous coriaceous, 1-locular. Seed 1, suberect, embryo...? —A small softly pubescent tree; leaves alternate ovate entire or serrulate; stipules very small deciduous; flowers[5] in axillary and terminal filiform glomeruliferous spikes, bracteolate. (*Brazil.*[6])

23? **Siphonodon** Griff.[7]—Flowers hermaphrodite; receptacle rather thick cupular. Sepals 5, imbricate. Petals same in number, alternate longer, erect open, imbricate. Stamens 5, alternipetalous, slightly perigynous with perianth; filaments 1-adelphous at base, complanate, incurved at free apex; anthers basifixed shortly subsagittate; cells marginal oblique linear, subextrorsely rimose. Germen immersed at base in hollow of receptacle and adnate to it; cells ∞,[8] unequally pluriseriate; ovules in each solitary, ascending; style (?) central (subgynobasically) inserted vertically intruding between the germens, at apex obtuse or subemarginate and surrounded at base with ∞[9] of unequal papillose squamules. Fruit drupaceous, sparsely fleshy, umbonate at apex; pyrenes ∞, thickly woody compressed, obliquely superposed, 1-spermous. Seeds glabrous, ascending and descending; albumen subcorneous; cotyledons of axillary embryo foliaceous suborbiculate; radicle very small. Small glabrous trees; leaves alternate petiolate crenate or serrate; stipules minute caducous; flowers[1] axillary few (2–5) spuriously umbellate; pedicels minutely bracteolate. (*Australia*, *Java.*[3])

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[1] Minute, white or greenish.

[2] Spec. 6 (2 of which are Old World). A. Gray, *Amer. Expl. Exp. Bot.* i. 290, t. 24.—Karst. *Fl. Columb.* ii. 47, t. 124. — Turcz. *Bull. Mosc.* (1863), i. 605 (*Theaphyllum*).—Miq. *Fl. Ind.-Bat.* i. p. ii. 591 (*Caryospermum*).—F. Muell. *Fragm.* v. 202 (*Caryospermum*).—Walp. *Rep.* i. 539; *Ann.* iv. 427; vii. 581 (*Caryospermum*), 582. There is no valid distinction between *Perrottetia* and *Caryosperma*, whose cells are 2-ovulate; the spurious septum often observed in the *Perrottetia* being produced between the seeds of the same cell. The flower, except its alternipetalous stamens, is quite *rhamnaceous*.

[3] *Nov. Gen. et Spec.* iii. 85, t. 235.—Endl. *Gen.* n. 5685.—B. H. *Gen.* 366, n. 25.

[4] From description and figure nearly of *Catha* ("1 in. long, ¼ in. thick"), by which alone the genus is distinguished from the otherwise closely allied *Perrottetia*.

[5] Very small, according to figures, pale pink.

[6] Spec. 1. *F. multiflora* Mart.—Reiss. *Mart. Fl. Bras. Celastr.* 32, t. 4, fig. 16.—Walp. *Rep.* ii. 536.

[7] *Calc. Journ. of Nat. Hist.* iv. 247, t. 14.—B. H. *Gen.* 370, 998, n. 38.—Hook. *Fl. Ind.* i. 629.—*Asterogyne* Wall. *Hort. Calc.*

[8] Very likely 5, "divided by spurious septa between the ovules" (Hook. f.). (?)

[9] Stigmas cristate according to Hook. f. in Icon.

24. **Plenckia** Reiss.[3]—Flowers nearly of *Celastrus* (or *Elæodendron*), 5-merous; germen immersed in disk 2-locular; ovules in cells 2, collaterally ascending. Fruit dry, indehiscent samaroid; pericarp subglobose, at apex marginally produced equally on both sides to straight linear-oblong membranous venose wing slightly dilated and obtuse at apex. Seed in very elongate cell 1, suberect cylindrical acute glabrous; testa coriaceous; albumen fleshy; cotyledons of thin axile (greenish) embryo linear elongate; radicle short inferior.—Glabrous trees; leaves alternate long and slenderly petiolate, generally ovate,[4] serrate veined (poplar like); stipules minute, flowers[5] in compound axillary pedunculate cymes. (*Brazil.*[6])

25. **Tripterygium** Hook. F.[7]—Flowers of *Celastrus*, 5-merous; anthers broadly oblong. Germen free, 3-gonal; style short, apex stigmatose obtusely 3-lobed. Ovules in 3 incomplete cells in pairs ascending. Fruit[8] dry, apiculate to style, 3-gonal, 3-alate; wings widely membranous. Seed in cell 1, solitary suberect; embryo small, at base of copious fleshy albumen; cotyledons oblong; radicle inferior.—A glabrous (climbing ?) shrub; leaves alternate petiolate ovately elongate serrate venosely striolate; stipules 0; flowers (small) in short terminal axillary racemes. (*Formosa.*[9])

26. **Mortonia** A. Gray.[10]—Flowers hermaphrodite; receptacle very concave obconical or subcampanulate and lined with glandulous disk. Sepals, 5 inserted at mouth of receptacle, imbricate at scarious margin. Petals 5, alternate with sepals, sessile concave eroded,

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[1] Yellow, purple striped.

[2] Spec. 2. Miq. *Fl. Ind.-Bat.* i. p. ii. 592. —Hassk. in *Retzia*, i. 150.—Hook. f. *Trans. Linn. Soc.* xxii. 133, t. 26.—Benth. *Fl. Austral.* i. 403.—Walp. *Rep.* v. 404; *Ann.* iv. 431; vii. 585.

Mart. Fl. Bras. Celastr. 30, t. 5, 10.—B. H. *Gen.* 368, n. 33.

[4] One variety, very narrow.

[5] Small, white or yellow.

[6] Spec. 1, 2. Fruit, nearly of *Fraxinus*.

[7] *Gen.* 368, n. 32.

[8] Semi-uncial.

[9] Spec. 1. *T. Wilfordii* Hook. f.

[10] *Pl. Wright.* i. 35, t. 4; ii. 28.—B. H. *Gen.* 368. n. 30.

caducous. Stamens 5, alternipetalous, inserted between as many oppositipetalous lobes of the disk, very perigynous; filaments free; anthers introrse cordately 2-dymous, 2-rimose. Germen inserted at bottom of receptacle, inferior at base only, otherwise free; cells 5, alternipetalous, more or less incomplete; ovules in each 2, basilar; style cylindrical, apex divided into 5 short stigmatose branches. Fruit inferior, crowned with calyx, dry or crustaceous, indehiscent, 1-spermous; testa of exarillate seed membranous; albumen scarce; cotyledons of straight embryo oblong.—Very ramose (ericoid) shrubs; leaves (evergreen) alternate closely packed small coriaceous enervate subsessile; stipules minute glanduliform, caducous; flowers[1] in compound terminal racemes; pedicels articulate, bracteolate under the apex.[2] (*Texas*, *North Mexico*.[3])

27. **Glossopetalon** A. GRAY.[4]—Flowers hermaphrodite; receptacle lined with thin glandulous cupular 10-crenate disk. Sepals 5, short persistent. Petals 5, alternate, much longer, linear ligulate, marcescent. Stamens 10, 2-seriate; filaments inserted in hollows of disk perigynous, short free; anthers short introrse. Germen free, immersed at base in central disk, 1-locular; style very short, apex capitellate[5] stigmatose; ovules 2, subbasilar suberect; micropyle extrorsely inferior. Fruit dry coriaceous (finally 2-valvate?) obliquely ovoid apiculate, much striated longitudinally; seeds 1, 2, ascending; funicle short dilated to a small 2-lobed aril; testa short; embryo...?—An extremely ramose and spinose glabrous shrub; branches punctulate; leaves alternate small entire subspathulate, exstipulate; floral leaves squamiform; petiole much dilated at base; flowers[6] axillary pedunculate, bracteate at base. (*Texas*, *New Mexico*.[7])

28. **Canotia** TORR.[8]—Flowers regular hermaphrodite. Calyx small, glandulously decurrent at base, 5-fid, valvate, persistent. Petals 5, sessile, imbricated. Stamens 5, alternipetalous, hypogynous; filaments free subulate, persistent; anthers cordate shortly

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[1] Small, white.

[2] A genus resembling some *Rhamnaceæ* in the form of its receptacle and its ovules, differing chiefly in its alternipetalous stamens. The structure of its flowers strongly recalls certain *Myrtaceæ*, from which it is distinguished generally by the leaves and the germen not being free.

[3] Spec. 3, 4. TURCZ. *Bull. Mosc.* (1858), i. 453.—WALP. *Ann.* iv. 425; vii. 583.

[4] *Proc. Amer. Acad.* xi. 73 (Sapindaceæ?) *Pl. Wright.* ii. 29, t. 12, B.—B. H. *Gen.* 368, n. 31.

[5] Stigma hence emarginate subreniform.

[6] Small, white.

[7] Spec. i. *G. spinescens* A. GRAY.—WALP. *Ann.* iv. 426.

[8] *Wippl. Exp. Bot.* 12.—H. BN. *Adansonia*, x. 18.

acuminate, introrsely 2-rimose versatile (?), deciduous. Germen superior free, thickened at base to a glandular disk; style cylindrical tubular, apex divided into 5 short recurved alternipetalous 2-dentate laciniæ extending inwards to linear stigmatiferous costa; cells 5 oppositipetalous, subincomplete at apex; ovules 5, 6, inserted in 2 series in internal angle, anatropous. Capsule terete narrow-oblong, style subulate persistent apiculate, septicidally 5-valvate; valves 2-fid at apex; epicarp thin fleshy; endocarp ligneous. Seeds 1, 2, ascending, produced below to a vertical membranous wing; albumen slightly fleshy; cotyledons of large axial embryo lateral plane elliptical; radicle terete inferior.—A glabrous ramose leafless shrub; branches remotely alternate terete striate produced to long spines marked with squamiform bracts or their dark scars when removed; flowers in short lateral alternate pedunculate few-flowered cymes; pedicels articulate below the middle; the fructiferous ones open curved. (*New Mexico.*[1])

II ? STACKHOUSIEÆ.

29. **Stackhousia** Sm.—Flowers hermaphrodite regular; receptacle concave cupular or hemispherical, lined with a thin disk. Sepals 5, inserted at margin of receptacle, unequal, imbricate. Petals 5, alternate, inserted perigynously with the sepals, much longer, free at base, above united in a more or less elongate tube and at the apex again free and reflexed; imbricate in prefloration. Stamens 5 alternipetalous, inserted with the perianth; filaments free erect, 2 alternate shorter; anthers oblong, introrsely 2-rimose. Germen free inserted at bottom of receptacle sessile, 2–5-locular; style erect, more or less deeply 2–5-fid; branches stigmatose within. Ovules in cells solitary subbasilar ascending; micropyle extrorsely inferior. Fruit 2–5-coccous; cocci indehiscent finally dry. Smooth or rugose or reticulate, sometimes with broad vertical wings; mesocarp thin; putamen smooth or rugose; columella central. Seeds ascending; testa thin; albumen fleshy; embryo axile straight nearly equal in length to the albumen; cotyledons short; radicle inferior terete.—Perennial herbs; oftener with a woody rhizome; branches herbaceous erect simple or slightly branched; leaves alter-

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[1] Concerning a genus formerly, but not rightly, referred to *Rosaceæ-Quillajeæ*; see *Nat. History f. Plants*, i. 391, n. 6.

nate, entire, linear or spathulate; stipules very small or 0; flowers at the top of the twigs in simple or more rarely compound spikes, 3-bracteate. (*Australia*, *New Zealand*, *Philippine Isles.*) See page 8.

30. **Macgregoria** F. MUELL.[1]—Flowers hermaphrodite; receptacle very shortly cupular. Sepals 5, imbricate, persistent. Petals 5, alternate, much longer, hardly perigynous, imbricate or tortuous, deciduous. Stamens 5, alternipetalous; filaments very short erect; anthers basifixed erect oblong, introrsely 2-rimose; connective produced beyond the cells to a small glandule. Germen free 5-lobed; carpels distinct subfree; styles connate in short columella, afterwards free linear-subulate; column above the germen dilated to a thin calyptriform membrane. Ovules in carpels solitary suberect; micropyle inferior, finally lateral. Carpels in fruit 3–5, free, indehiscent; albumen of suberect seed fleshy; embryo axile subequal to albumen, cotyledons plano-convex; radicle short inferior.—An annual glabrous herb; leaves alternate linear; flowers in terminal racemes; pedicels bracteate at base.[2] (*Central Australia.*)

III. GOUPIEÆ.

31. **Goupia** AUBL.—Flowers hermaphrodite; receptacle short. Calyx short, 5-lobed; imbricate in prefloration. Petals 5, alternate, much longer than the calyx, induplicate valvate, far attenuated to inflexed apex and subspathulate at summit. Disk cupular, interior to petals, shortly 5-lobed; lobes oppositipetalous. Stamens 5, alternipetalous, inserted in hollows of disk; filaments very short erect; anthers subovate introrse, 2-locular, 2-rimose; connective produced beyond the cells and there very setose. Germen free sessile depressed, 5-locular; cells oppositipetalous; styles 5, eccentric, stellately divaricate arcuately subulate. Ovules in cells ∞, inserted in 2 series on subbasilar placenta in internal angle, ascending or subhorizontal. Fruit a small subglobose berry. Seeds few ascending; testa thick; cotyledons of axile curved embryo oblong; radicle cylindrical; albumen fleshy.—A small glabrous tree; leaves

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[1] *Nuovo Giorn. Bot. Ital.* (1873), 128; *Fragm. Phyt. Austral.* viii. 160.

[2] One species (*M. racemigeræ* F. MUELL.) connects the Stackhousias as defined by us with the Floerkeas of the order *Geraniaceæ*. It differs from *Floerkea* chiefly in its exalbuminous seeds.

alternate petiolate, entire coriaceous venose, sub-3-plinerved; stipules minute, caducous; flowers in axillary pedunculate (spurious?) umbels; pedicels slender; buds conical. (*Guiana.*) See p. 10.

IV. AZIMEÆ.

32. **Azima** Lamk.—Flowers polygamo-diœcious regular; calyx sacciform membranous, valvate, 4- or unequally-fid. Petals 4, often narrow, not continuous at base. Stamens 4, alternipetalous; filaments subulate longer than the corolla (sometimes in female flowers connate with it in a short ring); anthers short, introrsely 2-rimose (in female flower effete). Germen (in male flower rudimentary) free, 2-locular; cells sometimes 2-locellate; style short, apex stigmatose capitate subentire or divided into 2 acute reflexed lobes. Cells 1-ovulate (*Euazima*) or 2-ovulate (*Actegeton*) and protected by a spurious septum between each ovule. Ovules subbasilar ascending; micropyle extrorsely inferior (often finally lateral). Fruit baccate globose, 1–4-spermous; testa of erect seed cartilaginous; cotyledons of exalbuminous fleshy embryo suborbiculate plano-convex, auriculate at base; radicle short inferior concealed in auricules.—Shrubs more or less sarmentous; leaves opposite entire coriaceous; stipules lateral articulate, spines (the costæ of the leaves) in axils of leaves 2 or 4–6 (of which 2 are smaller); flowers in axils of leaves solitary glomerate, cymose or racemoso-cymose. (*Tropical Asia, Indian Archipelago, southern and tropical Eastern Africa, continental and insular*). See p. 11.

33. **Dobera** J.[1]—Flowers (nearly of *Azima*) polygamous (or hermaphrodite?); receptacle shortly cupuliform. Calyx gamophyllous, valvate, unequally divided or 4-lobed. Petals 4, free. Glandules 4, oppositipetalous, flat thick. Stamens 4, alternipetalous; filaments 1-adelphous[2] to middle; anthers elongate subsagittate introrse. Germen (in female flower effete) 2–5-locular; 1 cell fertile; ovule of *Azima*. Berry ellipsoid, seed[3] and other characters of *Azima*.—Trees; leaves opposite entire articulate; stipules very small;

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[1] *Gen.* 425.—Poir. *Dict.* Suppl. ii. 493.—Pl. *Ann. Sc. Nat.* sér. 3, x. 191.—H. Bn. *Adansonia*, x. 31.—A. DC. *Prodr.* xvii. 30.—*Tomex* Forsk. *Æg.-Arab.* 32 (not L. nor Thunb.).—*Schizocalyx* Hochst. *Flora* (1844), Beibl. 1.—A. Rich. *Fl. Abyss. Tent.* i. 108.—Endl. *Gen.* Suppl. iv. 75.

[2] Like *Meliæ*.

[3] Indumentum purple sub-fleshy; embryo green (ex Ehrenb. Icon. Lithogr. ined.)

flowers[1] in axillary terminal and more or less ramose spikes, articulate at concave base. (*Eastern Africa, south-western Asia.*[2])

34. **Salvadora** Garcin.[3]—Flowers (nearly of *Azima*) hermaphrodite or polygamous; calyx 4-fid, alternately imbricate, persistent. Petals[4] 4, longer and broad, contorted or imbricate, closely coadunate with each other to middle and by means of the filaments into a spurious gamopetalous corolla. Stamens 4; filaments alternipetalous adherent to corolla at base, above free; anthers introrse. Germen superior, 1-locular,[5] apex truncate-sessile stigmatic; ovule in cell 1 (of *Azima*). Berry, seed, and other characters of *Azima.*—Small trees or shrubs; leaves opposite simple, sometimes very coriaceous; stipules very small, caducous; flowers[6] in simple or more or less compound ramose spikes, bracteate. (*Southern Asia, tropical and subtropical western and eastern continental and insular Africa.*[7])

V. HIPPOCRATEEÆ.

35. **Hippocratea** L.—Flowers hermaphrodite; sepals 5, small and petals same in number, longer, imbricate, or valvate. Stamens 3 (or rarely 5; 2, 3 antherous); filaments free or adnate to germen at dilated base, apex attenuated, recurved or reflexed. Anthers 2-locular or 4-locellate, didymous or oblong; cells finally confluent and extrorsely dehiscent. Disk covering receptacle, broadly explanate, conical or cupular. Germen either free, or confluent with disk, 3-locular; style short subulate, apex stigmatic subentire, 3-lobed or 3-fid; ovules in cells 2-∞, inserted in two series in the internal angle of the cells. Carpels of fruit 3, generally dry, connate at base, afterwards compressed or broadly aliform, coriaceous indehiscent or laterally 2-valvate. Seeds compressed,

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[1] White.

[2] Spec. 1, 2, imperfectly known.

[3] *Act. Angl.* 1749 (L. *Gen.* ed. 6, 163).—J. *Gen.* 84.—Lamk. *Ill.* t. 8.—Poir. *Dict.* vi. 483; Suppl. v. 28.—Spach, *Suit. à Buffon* xiii. 335.—Endl. *Gen.* n. 2177.—Pl. *Ann. Sc. Nat.* sér. 3. x. 189.—Lindl. *Veg. Kingd.* 652, fig. 436.—Payer, *Fam. Nat.* 14.—Lem. *et* Dcne. *Tr. Gén.* 453.—H. Bn. *Adansonia*, ix. 287.—A. DC. *Prodr.* xvii. 27.

[4] The annular internode disjoined from the calyx.

[5] "Vestigia interdum loculi abortientis discernere suspicatus sum." (A. DC. *loc cit.* 28.)

[6] Very small, white or greenish.

[7] Spec. 1, 2. L. *Spec.* i. 178; *Syst.* 889 (*Rivinia*).—Forsk. *Æg.-Arab.* 32 (*Cissus*).—Retz. *Obs.* iv. 23, 24 (*Embelia*).—Vahl, *Symb.* i. 12.—Roxb. *Pl. Coromand.* i. 26, t. 26; *Fl. Ind.* (ed. Wall.), i. 404 —Wight, *Ill.* ii. 229, t. 181; *Icon.* t. 1621.—Dcne. *Jacquem. Voy. Bot.* iv. 140, t. 144.—Walp. *Ann.* iii. 282.

ascending, dorsally inserted, oftener produced below to a membranous wing and imbricate; raphe produced to a wing from base to apex; testa of nucleus coriaceous or crustaceous, sometimes rugose; cotyledons of exalbuminous embryo fleshy conferruminate; radicle short inferior.—Small trees or climbing shrubs; leaves opposite entire or serrate; petiole articulate; stipules small, caducous; flowers in axillary or terminal simple or oftener compound racemose cymes. (*All tropical regions*). See p. 13.

36. **Salacia** L.[1]—Flowers of *Hippocratea*; petals 5, open imbricate. Anthers 2-dymous, 2-locular; cells transversely rimose (*Tontelea*[2]) or longitudinally dehiscent (*Eusalacia*), *Diplesthes*,[3]) sometimes confluent in 1 transversely elongate and finally 1-rimose cell (*Anthodon.*[4]) Gynæcium and other characters of *Hippocratea.* Fruit baccate, spherical, ovoid or obovoid, thickly corticate; pulp mucilaginous. Seeds 1-∞, oftener angular, sometimes arillate; cotyledons of exalbuminous or more rarely (*Calypso*[5]) albuminous embryo[6] thick, free or conferruminate; radicle short inferior.—Erect sarmentous or climbing glabrous shrubs; leaves opposite or more rarely (*Diplesthes*) alternate, entire, or crenate or serrate; stipules very small or 0; flowers[7] axillary, solitary, 2-nate or oftener cymose-∞, sometimes in terminal compound cymiferous racemes.[8] (*All tropical regions.*[9])

37. **Campylostemon** Welw[10].—"Flowers (nearly of *Hippocratea*) 5-merous; petals open. Stamens 5, inserted in scarcely visible disk; filaments incurved; anthers 4-locellate, introrsely transversely rimose. Germen 3-locular; stigma sessile 3-fid; ovules in cells 6–8, 2-seriate.

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[1] *Mantiss.* 293.—J. *Gen.* 424.—Poir. *Dict.* vi. 450.—DC. *Prodr.* i. 570.—Spach, *Suit. à Buffon,* ii. 400.—Endl. *Gen.* n. 7502.—B. H. *Gen.* 370, n. 37.—H. Bn. *Payer, Fam. Nat.* 326.—Hook. *Fl. Ind.* i. 625.

[2] Aubl. *Guian.* i. 31, t.—Lamk. *Ill.* t. 26.—Endl. *Gen.* n. 5701.—*Tonsella* Schreb. *Gen.* n. 74.—*Sicelium* P. Br. ex Poir. *op. cit.* v. 146.—*Johnia* Roxb. *Fl. Ind.* i. 168.—*Anthodiscus* Mart. *Schult. Mantiss.* i. 253, (not Mey.).

[3] Harv. *Hook. Lond. Journ.* i. 19.

[4] R. et Pav. *Fl. Per. et Chil.* i. 45, t. 74.—*Clercia* Velloz. *Fl. Flum.* 29, t. 73, 74.—*Raddisia* Leandr. *Münch. Denkschr.* vii. 244, t. 15 (Endl.).

[5] Dup.-Th. *Hist. Vég. Iles Afr. Austr.* i. 29, t. 6.

[6] Sometimes green.

[7] Small, yellowish or white.

[8] A genus distinguished from *Hippocratea* only by the nature of its fruit.

[9] Species about 60. Wight, *Hook. Bot. Misc.* iii. Suppl. t. 36; *Ill.* t. 46; *Icon.* t. 962.—Wight and Arn. *Prodr.* i. 104.—H. B. K. *Nov. Gen. et Spec.* v. 140, t. 443 (*Tontelea*).—A. S. H. *Fl. Bras. Mer.* ii. 104, t. 104 (*Calypso*).—Bl. *Bijdr.* 218.—Tul. *Ann. Sc. Nat.* sér. 4, viii. 93.—Guillem. et Perr. *Fl. Sen. Tent.* i. 113, t. 27. Harv. and Sond. *Fl. Cap.* i. 230.—Oliv. *Fl. Trop. Afr.* i. 372.—A. Gray, *Amer. Expl. Exp. Bot.* i. 286.—Griseb. *Fl. Brit. W.-Ind.* 148.—Korth. *Verh. Nat. Gesch. Bot.* 38.—Miq. *Fl. Ind.-Bat.* i. p. ii. 597.—F. Muell. *Fragm.* v. 202.—Tr. *Ann. Sc. Nat. loc. cit.* 373.—H. Bn. *Adansonia,* x. 184; xi. 272.—Walp. *Rep.* i. 400, 401; v. 146; *Ann.* i. 130; ii. 193; iv. 368; vii. 584.

[10] Ex B. H. *Gen.* 998, n. 35 *a.*

Fruit . . . ?—A scandent glabrous shrub; leaves opposite oblong acuminate serrate; flowers[1] in axillary cymes much shorter than the leaf.[2] (*Angola*).

V. *bis.* OLINIEÆ.

38. **Olinia** Thunb.—Flowers hermaphrodite; receptacle very concave surrounding the adnate germen below, and far produced in a tube above; the mouth round the insertions of the perianth produced externally to a short subentire or obscurely sinuate ring. Sepals 4–5, inserted in the throat of the receptacle subspathulate (coloured), pilose within at base, valvate. Petals 4–5, inserted and alternating with the sepals, short squamiform incurved subcucullate, valvate. Stamens same in number oppositipetalous; filaments short incurved; anthers small 2-dymous; connective produced beyond the (introrsely rimose) cells to a cupuliform glandule. Germen inferior, adnate to bottom of receptacle, 3–5-locular; style erect, apex subclavate stigmatose. Ovules in cells 2–3, ascending; micropyle extrorsely inferior. Fruit drupaceous, areolate at truncate apex; putamens 3–5, oftener 1-spermous. Seed ascending "exalbuminous; testa thinly coriaceous; cotyledons of axile embryo irregularly convolute; radicle short inferior."—A glabrous shrub; leaves opposite petiolate entire penninerved coriaceous. Flowers in short axillary oftener 3-chotomous cymes. (*South Africa.*)

VI. BUXEÆ.

39. **Buxus** T.—Flowers monœcious or more rarely diœcious apetalous; male calyx 4-partite; laciniæ decussately imbricate. Stamens 4, opposite the petals; filaments free, inserted under the oftener 4-gonal rudiment of the gynæcium; anthers introrse 2-rimose. Female sepals often 6, 2-seriately 3-nate, imbricate. Staminodes 0. Germen free 3-locular; cells opposite exterior sepals; styles free, very rarely connate at base, oftener separate from each other and peripheric, sulcate within and stigmatose at subbilobed apex; top of the germen slightly prominent between the styles and turgidly tuber-

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[1] "Small, sulphur coloured."

[2] One species, unknown to us, closely connects the "*Hippocrateæ* with the rest of the *Celastrineæ*" (B. H.).

culate. Ovules in cells 2, inserted under the apex in the internal angle, collaterally descending; micropyle introrsely superior. Capsule coriaceous, loculicidal; columella short or 0; valves at apex 2-cornute septiferous within; seeds in each 1, 2; testa crustaceous nitid; hilum concave thickened to an aril within; albumen copious fleshy; embryo axile longitudinally subequal to albumen, straight or slightly curved; cotyledons oblong elliptical; radicle equal or longer superior.—Shrubs or under-shrubs (evergreen); branches often 4-gonal; leaves opposite petiolate exstipulate entire penninerved; flowers axillary. The female terminal pluribracteate; the male inferior spicate (*Eubuxus*) or oftener racemose pedicellate (*Tricera*), 1-bracteate; bracts decussate imbricate. (*Europe and temperate Asia*, *tropical eastern Africa*, *Madagascar*, *central America*, *Antilles*.) See page 16.

40. **Pachysandra** Michx.[1]—Flowers nearly of *Buxus;* male sepals 4. Stamens 4,[2] inserted under the rudiment of the gynæcium. Female sepals 4–6. Germen small oftener 3-locular; styles much longer patulous, stigmatose within and to the subbilobed apex. Ovules (of *Buxus*) in cells 2; micropyle introrsely superior [3] obturate. Capsules 2, 3-coccous, with 2 persistent styles, 3-cornute; seeds ovoid or subglobose; testa crustaceous nitid, thickened to hilum produced to an aril[4] to summit of raphe; albumen and other characters of *Buxus.*—Perennial herbs;[5] rhizome and branches herbaceous terete; leaves alternate petiolate exstipulate subovate coarsely serrate; flowers terminal or cauline in axils of leaves or bracts spikelike; flowers[6] alternate; the female few inferior; the male superior more numerous, sessile or very shortly pedicellate, often bracteolate. (*North America*, *Japan.*[7])

41. **Sarcococca** Lindl.[8]—Flowers nearly of *Buxus;* the male 4-androus.[9] Female sepals 4–6, imbricate in 2 series. Germen 2–3-

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[1] *Fl. Bor.-Amer.* ii. 177, t. 45.—A. Juss. *Tent. Euphorbiac.* 13, t. 1, fig. 2.—Turp. *Dict. Sc. Nat.* Atl. t. 277.—Endl. *Gen.* n. 5870.—H. Bn. *Monogr. Buxac.* 10, 19, 55, t. 3, fig. 1–14; *Adansonia*, xi. 283.—M. Arg. *Prodr.* 21.

[2] Pollen stellately reticulate.

[3] Integument 2-plicate.

[4] Thickly annular, concave within, white.

[5] Generally reddish.

[6] Sepals red spotted; stamens very conspicuous, white.

[7] Spec. 2. Pursh. *Fl. N.-Amer.* i. 117.—A. Gray, *Man.* ed. 5, 439.—Sieb. et Zucc. *Abh. Math.-Phys. Kl. Baier. Akad.* iv. p. ii. 142; *Fl. Jap. Fam.* 34.—Lodd. *Bot. Cab.* t. 910.—*Bot. Reg.* t. 33.—*Bot. Mag.* t. 1964.

[8] *Bot. Reg.* t. 1012.—Endl. *Gen.* n. 5875.—H. Bn. *Monogr. Buxac.* 48, t, 3, fig. 15–30.—M. Arg. *Prodr.* 11.—*Lepidopelma* Kl. *Waldem. Reis. Bot.* 118. t. 22.

[9] Pollen stellately subreticulate (M. Arg.).

locular; styles 2, 3, entire or 2-lobed at apex; ovules 2 (of *Buxus*) closed to micropyle. Fruit baccate or finally subdry, indehiscent; seeds and other characters of *Buxus* (or *Pachysandra*).—Shrubs (evergreen); branches terete; leaves alternate exstipulate entire, penninerved or oftener 3-plinerved to base; flowers[1] in racemes or axillary spikes; the female inferior. (*Southern Asia, Sumatra, Java.*[2])

42. **Simmondsia** NUTT.[3]—Flowers apetalous,[4] 1-sexual; male calyx 4, 5-partite, imbricate. Stamens 10–12, 2-seriate,[5] inserted in depressed receptacle; filaments free short; anthers ovately oblong extrorse; cells adnate, longitudinally rimose. Female calyx 4, 5-partite; folioles connivent to base dilated concave, attenuated at apex, imbricate, persistent. Germen free shorter than calyx conoid, 3-sulcate, 3-locular, crowned with 3 thick subulate papilliferous recurved branches of style. Ovules in cells solitary descending; micropyle introrsely superior. Capsules loculicidal, often 1-spermous, columelliferous in the centre; columella filiform, 3-partite, persistent. Seed descending; "cotyledons of exalbuminous embryo thick; radicle short superior."—Evergreen shrubs more or less villose; leaves opposite entire coriaceous penninerved exstipulate; flowers axillary; the male in short ramosely glomeruliferous spikes,[6] bracteate; the female solitary. (*California.*[7])

43. **Styloceras** A. JUSS.[8]—Flowers monœcious; the male nude. Stamens ∞ (5–30); filaments free very short, centrally inserted on suboblique receptacle; anthers erect basifixed, introrsely 2-rimose; apiculate at obtuse apex.[9] Female sepals 4–10, unequal, 2- or 3-cussate, imbricate. Germen free sessile, 2–3-locular; style 2, 3, peripheric or subconnate at base, stout, canaliculate stigmatose

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[1] Small, greenish or yellowish.

[2] Spec. 4, 5. DON, *Prodr. Fl. Nepal.* 63 (*Buxus*).—HOOK. *Exot. Fl.* t. 148 (*Pachysandria* ?).—WALL. *Cat.* n. 7979 (*Tricera*).—WIGHT, *Icon.* t. 1877.—THW. *Enum. Pl. Zeyl.* 290.—BL. *Mus. Lugd.-Bat.* ii. 191.

[3] *Hook. Lond. Journ.* (1844), 400, t. 16.—M. ARG. *Prodr.* xvi. p. i. 22.—LEM. et DCNE. *Tr. Gén.* 255.—*Brocchia* MAUR. *Cat. Hort. Napol.* (1845), 80.

[4] In a doubtful species (? of this genus), *S. pabulosa* KELL. *Proceed. Calif. Acad. Sc.* ii. 21), the male flower is described as having 5 petals.

[5] Of which the 5 exterior are alternisepalous.

[6] In *S. pabulosa* the male flowers are said to be 2-chotomous cymose.

[7] Spec. 1, 2, LINK, *Enum. Hort. Berol.* ii. 386 (*Buxus*).—TORR. *Mexic.*) *Bound. Surv.* 202, t. 49.

[8] *Tent. Euphorb.* 117, t, 17, fig. 56.—ENDL. *Gen.* n. 5773.—H. BN. *Ét. Gén. du Groupe des Euphorbiacées* (1858), 665, t. 20, fig. 25-37; *Monogr. Buxac. et Styloc.* 72, 77.—M. ARG. *Prodr.* 9.

[9] Pollen not reticulate (M. ARG.).

within. Ovules (nearly of *Buxus*) in cells 2, descending; micropyle introrsely superior; each cell finally divided, by a spurious dissepiment, into 2 1-ovulate cellules. Fruit suberose, indehiscent, finally dry subligneous, 2–6-locellate; cells 1-spermous. Seeds smooth; testa rather thick; hilum broad; albumen fleshy; radicle of subequal embryo superior terete. — Glabrous trees; leaves alternate petiolate exstipulate, entire coriaceous penninerved, sub-3-plinerved at base; flowers[1] in axillary spikes; spikes 1- or 2-sexual; male flowers inferior, 1-bracteolate; female 1- or pluribracteate. (*South Western America.*[2])

VIII. GEISSOLOMEÆ.

44. **Geissoloma** Lindl.—Flowers hermaphrodite regular apetalous; sepals 4, connate at base, ovate mucronate, alternately imbricate, persistent. Stamens 8, 2-seriate; filaments inserted at base of calyx, otherwise free, subulate; oppositipetalous longer; anthers short ovate versatile, introrsely 2-rimose. Germen free, 4-lobed; cells 4 (2 anterior), alternate with sepals, attenuate at apex to as many free styles, approximating to one pyramidally acuminate, longitudinally sulcate within and stigmatose under acute apex, at first spirally twisted together; ovules in cells 2, collaterally descending; micropyle introrsely superior. Fruit capsular, 4-locular, loculicidal; seeds in cells solitary or 0, oblong ancipitally compressed; testa very smooth nitid (dark), dilated at hilum to a small (white) aril continuous with the top of the somewhat thickened raphe and there attenuated and received in a short dorsal furrow of the testa; albumen fleshy; radicle of straight axile embryo (in length nearly that of the albumen) superior cylindrical; cotyledons linear fleshy.—A shrub; branches 4-gonal; leaves opposite, very shortly petiolate; stipules very minute glanduliform; limb entire coriaceous penninerved, somewhat thickened at margin; flowers axillary solitary, very shortly pedunculate, surrounded at base by 6–8 bracteoles, larger from the exterior to the interior and decussately imbricate. (*Cape of Good Hope.*) See p. 19.

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[1] Yellowish.

[2] Spec. 3, 4. W. *Spec.* iv. 733 (*Trophis*).—H. B. K. *Nov. Gen. et Spec.* vii, 172, t. 637, 638.—K. *Sym. Pl. Æquin.* iv. 206.—Spreng. *Syst.* iii. 906.

XLVII. RHAMNACEÆ.

I. THE BUCKTHORN SERIES.

The flowers of the *Buckthorns*[1] (fig. 39-43) are regular and hermaphrodite or polygamo-diœcious. The concave receptacle has the form of a deep cup or horn, lined with a thin layer of glandulous tissue, representing the disk, the bottom of which is occupied by the gynæcium, while its margin bears the perianth and andrœcium. The sepals, four (fig. 42) or five (fig. 40, 41) in number, are

Rhamnus cathartica.

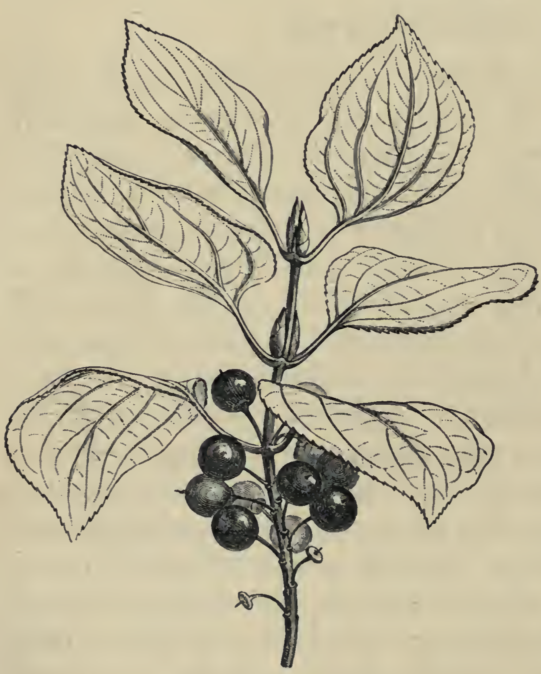

Fig. 39. Fructiferous branch.

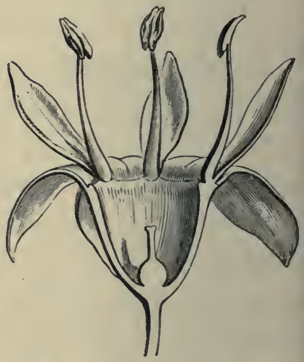

Fig. 40. Longitudinal section of male flower $(\frac{5}{1})$.

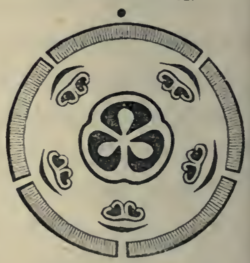

Fig. 41. Diagram.

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[1] *Rhamnus* T. *Inst.* 593, t. 366.—L. *Gen.* n. 265 (part.).—ADANS. *Fam. des Pl.* ii. 305.—J. *Gen.* 380.—GÆRTN. *Fruct.* ii. 110.—LAMK. *Ill.* t. 128.—POIR. *Dict.* iv. 461; Suppl. iv. 88. DC. *Prodr.* ii. 23.—AD. BR. *Mém. sur la Fam. des Rhamn.* (1826), 53, t. 2.—TURP. *Dict. Sc. Nat.* Atl. t. 270.—SPACH, *Suit. à Buffon.* ii. 447. —ENDL. *Gen.* n. 5722.—PAYER, *Organog.* 490, t. 97.—A. GRAY, *Gen. Ill.* t. 168.—B. H. *Gen.* 377. 998, n. 10.—H. BN. *Payer Fam. Nat.* 327.

triangular, thick, valvate, and the petals, alternate, small, flat, or spoon-shaped, are induplicated in the bud, or do not even touch, or replaced by three very narrow tongues, they may, in certain species, entirely disappear, The stamens, equal in number to the petals, are superposed (fig. 41) to and enveloped by them, each being formed of a short filament and a bilocular, introrse anther dehiscing by two longitudinal clefts.[1] The gynæcium, inferior but free, consists of an ovary with two, three, or four cells (sterile in the male flower), surmounted by a style more or less deeply divided into obtuse lobes and stigmatiferous at the summit. In each cell, at the base of the internal angle, are inserted one or, very rarely, two[2] ascending, anatropous[3] ovules. The micropyle is at first directed downwards and inwards; but, in consequence of a twist more or less decided, it often becomes lateral, as also the raphe, which is at first dorsal. The fruit is a drupe, at the base of which is seen a circular scar corresponding to the margin of the persistent and non-accrescent receptacle, enclosing, in a sarcocarp sometimes partitioned, one or four monospermous stones, often thin, membranous or parchment-like, often inferiorly incomplete, indehiscent or irregularly dehiscent. The seeds enclose under their integuments[4] a fleshy albumen which surrounds an embryo with a short inferior radicle. The cotyledons are flat and fleshy (*Frangula*), or foliaceous and recurved at the margin, in such a manner that one more or less envelops in its hollow the other which bounds internally a large vertical furrow. The albumen is sometimes wanting, and the thick cotyledons then become plano-convex. More than fifty species of

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—Hook. *Fl. Ind.* i. 638.—*Alaternus* T. *Inst.* 595, t. 366.—*Frangula* T. *Inst.* 612, t. 383.—Mœnch. *Meth.* Suppl. 271.—Gærtn. *loc. cit.* t. 106.—A. Gray, *Gen. Ill.* t. 167.—*Marcorella* Neck. *Elem.* n. 799.—*Cardiolepis* Rafin. *Neog.* (1825), n. 2.—? *Sciadophila* Phil. *Linnæa*, xxviii. 618.—? *Rhamnella* Miq. *Ann. Mus. Lugd.-Bat.* iii. 30 (*Microrhamnus* Maxim. not A. Gray).

[1] In all the *Rhamnaceæ* observed, the pollen grains were ovoid, with three folds and in water spherical with three papillary bands. (H. Mohl. *Ann. Sc. Nat.* sér. 2, iii. 338).

[2] Payer has seen, in the same ovary, one placenta bearing two ovules; another, only one; and a third, none. Finally each cell contained one ovule.

[3] The coat is double.

[4] The external seminal coat is membranous or more or less thick and coriaceous, sometimes the same throughout, sometimes traversed by a deep vertical furrow. In like manner the transverse section of the seed has nearly the form of a crescent, sometimes much curved, sometimes circular or oval. There are, however, all possible transitions between these diverse configurations. The raphe also may be dorsal, lateral, or even ventral. Below, the external coat of the seed often thickens into a sort of aril which may even extend across the void which the putamen presents below. On the organisation of the seeds of *Rhamnus* and of many other genera of this family, see: Benn. *Pl. Jav. Rar.* 131.—J. G. Ag. *Theor. Syst.* 178, t. 15.—Miers, *Contrib.* i, 230. t. 33.

Rhamnus[1] are known. They are trees or shrubs, with alternate leaves, sometimes more or less opposite, caducous or persistent, petiolate, penninerved and entire or dentate, accompanied by two small lateral caducous stipules. The flowers[2] are axillary, arranged in cymes rarely solitary, more generally compound or fasciculate, or united in a cluster on a small common axis.

Rhamnus pumilus.

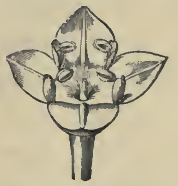

Fig. 42. Flower ($\frac{4}{1}$).

Rhamnus Frangula.

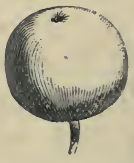

Fig. 43. Fruit ($\frac{2}{1}$).

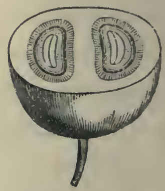

Fig. 44. Trans. sect. of fruit ($\frac{3}{1}$).

Beside *Rhamnus* are ranged, in this very strictly natural group, genera differing from it only in characters of very small value which would otherwise be considered of no importance. Such are *Rhamnidium*, trees or shrubs of tropical America, which have the leaves opposite or nearly so, and the flowers of the Buckthorns with a receptacle and a disk less deep, an ovary of two uniovulate cells and a fruit described as a berry with membranous endocarp, but which almost always finally becomes dry and thin, indehiscent, nearly ovoid, crowned with an apicule representing the remains of the style, and basally inserted in a persistent receptacular capsule;[3] *Karwinskia*, native of Mexico and the neighbouring regions of North America, having nearly the leaves of *Rhamnidium*, but finely punctate; the same flowers and fruits; but the two or three incomplete cells of the ovary contain each two ascending ovules instead of only one.

The *Emmenosperma* of Oceania, with alternate or opposite leaves, have polygamous flowers, similar to those of the Buckthorns in the obconical form of their receptacle, of the disk which clothes it and of the perianth. Their free ovary, generally bilocular, is succeeded by a capsular fruit the dehiscent cocci of which separate at their base from the receptacle on which remain the seeds, generally of a red colour, smooth and glossy. The receptacle and disk are the same also in *Sarcomphalus*, unarmed or prickly trees or shrubs from the Antilles, with thick triangular sepals and long-clawed petals. But the stamens have an extrorse anther with very distinct didymous cells, which, notwithstanding the marked incurvation of their filaments in the bud, occupies (like that of the *Melastomaceœ*) the interval which separates the free gynæcium from the coat of the receptacle covered by the disk. The fruit is an ovoid drupe, inserted in a deep receptacular cupule. The alternate leaves of these plants are often triplinerved and not unlike those of the *Lauraceœ*.

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[1] Lhér. *Sert.* t. 5, 8, 9.—Duham. *Arbr.* ed. nov. iii. t. 8, 10, 13, 15.—H. B. K. *Nov. Gen. et Spec.* vii. t. 616, 617.—Waldst. et Kit. *Pl. Rar. Hung.* t. 255.—Pall. *Fl. Ross.* ii. t. 61, 62.—Jacq. *Fl. Austr.* t. 53.—Vent. *Pl. Malmais*, t. 34.—Webb. *Phyt. Canar.* t. 67.—Gren. et Godr. *Fl.de Fr.* i. 335.—Cav. *Icon.* t. 181, 182.—Bl. *Bijdr.* 1139.—Hook. *Fl. Bor.-Amer.* t. 42-44.—Wight, *Icon.* t. 159.—A. Gray, *Man.* ed. 5, 114, 115.—C. Gay, *Fl. Chil.* ii. 17.—Harv. and Sond. *Fl. Cap.* i. 476.—Oliv. *Fl. trop. Afr.* i. 381.—Thw. *Enum. pl. Zeyl.* 74.—Miq. *Fl. Ind.-Bat.* i. p. i. 645.—Griseb. *Fl. Brit. W.-Ind.* 99 (*Frangula*).—Boiss. *Fl. Or.* ii. 14.—Seem. *Fl. Vit.* 41.—Reiss. *Mart. Fl. Bras. Rhamn.* 90, t. 29 (*Frangula*).—Tr. *Ann. Sc. Nat.* sér. 5, xvi. 379.—Maxim. *Rhamn. Or.-Asiat.* 6 (ex *Mém. Acad. Pétersb.* sér. 7, x).—Walp. *Ann.* i. 192; ii. 267; iii. 842; vii. 588.

[2] Greenish, yellow, or whitish.

[3] *Macrorhamnus*, a tree of Madagascar, with sub-opposite leaves, large 5–7-nerved at the base, with seeds flattened, otherwise analogous to those of *Rhamnus*, cannot be definitely classed because its flowers are unknown. But its drupaceous superior free fruit indicates an alliance with the genera here collected, at the same time it is distinguished from them by its cocci with elastic dehiscence similar to those of the *Euphorbiaceæ*, and separating at maturity from a fleshy mesocarp, itself divided into three bifid pannels.

Hovenia, trees of temperate Asia, differ from the preceding genera in their floral receptacle being more open, furnished likewise, however, with a thin disk which lines the entire cavity, and in their ovary not being completely free but slightly adherent at the base. They are beautiful trees, with alternate unsymmetrical leaves resembling those of our Limes. The flowers are arranged in cymes the axes of which thicken and become quite fleshy and succulent as the fruit attains maturity (Fig. 45). *Noltia*, a South African shrub, with dentate leaves, has also an ovary adhering at its base and surrounded, where it begins to be free, by a disk which, covering the interior of the receptacle with a thin layer, ascends as far as the insertion of the perianth and the andrœcium. But its fruit, decidedly dry, is inserted, nearly to the middle, in a deep cupule formed by the accrescent receptacle, and it separates at maturity into three cocci dehiscing longitudinally within. *Colubrina* has a fruit similar to that of *Noltia*; but in the flower the ovary is still more deeply sunk in the concavity of the receptacle from which it is inseparable, and is surrounded by a thick disk to which it equally

Hovenia dulcis.

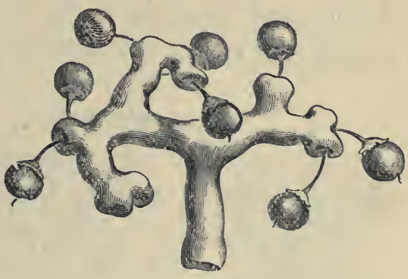

Fig. 45. Portion of fructiferous inflorescence.

adheres. The *Colubrinas* are common to all tropical countries; they are erect or climbing shrubs, unarmed, with leaves almost constantly alternate. *Cormonema*, prickly trees or shrubs of Brazil, with alternate leaves and axillary cymes, have the flower and fruit of *Colubrina*, from which perhaps they ought not to be generically separated. They can always be easily distinguished at the first glance by the presence of two sessile glands at the base of the foliar limb. *Alphitonia* has nearly the flowers of *Colubrina*, with the ovary in great part inferior and the fruit sunk to nearly the middle in the receptacular cup. The mesocarp sometimes remains thin and dry to the end; but it often thickens and becomes fleshy or suberose. In any case it finally separates into cocci dehiscing internally which, like those of the *Emmenosperma* and of some *Colubrina*, are basally detached from the receptacle on which the seeds remain. The latter are red and large; but, in the species producing a drupaceous fruit, they are partly enveloped in a well developed aril. The *Alphitonias* are Oceanian, arborescent, nearly always covered with a ferruginous or whitish down, rarely glabrous; they have alternate leaves and multifloral cymes, axillary or terminal.

Berchemia, erect or climbing shrubs from the warm regions of Asia, Africa, and America, with the general organisation of the preceding genera and the ovary inferiorly adherent, presents however these differences. The receptacle is in form a shallow cup, or nearly plane, the margin of which bears the perianth and andrœcium. The latter are therefore sometimes nearly hypogynous. The disk which surrounds the base of the ovary, instead of being a thin layer covering the coats of the receptacle, rises in the form of a well or sack the upper opening of which is transversed by the style. The flowers are disposed in clusters of cymes, axillary or terminal and ramified, and the drupaceous fruit with bilocular stone, is accompanied at its base by the receptacular cupule. *Sageretia*, found in the same regions (except Africa), has also a disk freely raised between the ovary and the receptacle, the free margin of which

Ventilago maderaspatana.

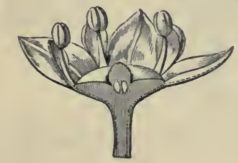

Fig. 47. Long. sect. of flower.

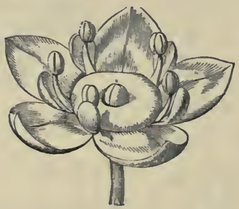

Fig. 46. Flower ($\frac{3}{1}$).

is festooned; but the fruit is drupaceous, with two or three indehiscent stones, and the small flowers are disposed (often in glomerules) on the opposite and divaricate branches of a large compound terminal cluster. *Scutia*, glabrous shrubs, often armed with hooked spines, growing in Asia, Africa, and South America, has nearly the same flowers, slightly fleshy, as *Sarcomphalus*, a disk free above but thicker and shorter, often undulated at the margin, and the fruit encloses two or three crustaceous nuts; but the flowers occupy the axils of the thick and coriaceous leaves, and are in umbelliform cymes.

Ventilago leiocarpa.

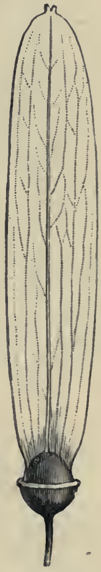

Fig. 48. Fruit.

Ceanothus also has nearly the flower of *Scutia*; but the floral receptacle, in form a shallow cupule, is filled with the short and thick disk, and the long-clawed petals rise in the intervals of the connivent sepals. To the semi-inferior ovary succeeds a drupaceous fruit, but the exocarp of which separates from the inwardly dehiscent cocci. *Ceanothus* abounds especially in the southern and western regions of North America and in Chili. They are shrubs with alternate and penninerved or triplinerved leaves. The inflorescence is terminal in dense and ramified cymiferous clusters.

In *Ventilago* (fig. 46–48), of which a distinct tribe has sometimes been made, the receptacle is also a hollow shallow cup, filled with the thick flattened and depressed disk; but the semi-inferior and bilocular ovary is succeeded by a dry indehiscent fruit, accompanied at the base by a receptacular cupule, and the persistent style is dilated to a flattened, rigid, membranous and veined wing. They are climbing shrubs from all tropical regions of the old world. The leaves are alternate, and the flowers collected in simple or compound cymes. *Smythea*, having the same foliage and flowers, and inhabiting Polynesia and the Indian Archipelago, is distinguished by its oval, flattened, ligneous fruit, dehiscing in two valves following the middle of the two faces. In these two genera the seeds are destitute of albumen.

Paliurus australis.

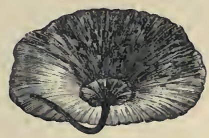

Fig. 49. Fruit.

Paliurus (fig. 49) was formerly ranged among the Jujubes (*Zizyphus*), and gave its name to a separate tribe because its semi-inferior ovary was succeeded by an indehiscent fruit with a one- or many-celled putamen. The hard and dry pericarp is dilated above into a wide orbicular and horizontal wing. They are prickly shrubs of temperate Asia and the Mediterranean region. The true Jujubes (fig. 50–53) have, like them, spinous branches, and alternate 3–5-nerved leaves; but the fruit is a drupe with osseous or ligneous putamen, with one or many monospermous cells. The seeds enclose an embryo without, or with a very thin, albumen. They are trees or shrubs from all warm regions of the globe.

Zizyphus vulgaris.

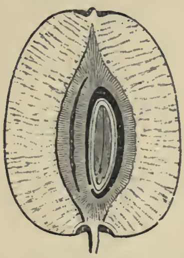

Fig. 53. Long. sect. of fruit

Zizyphus vulgaris.

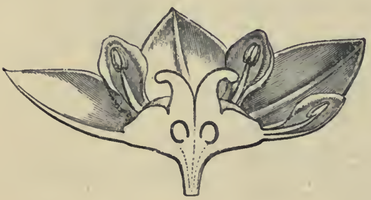

Fig. 51. Long. sect. of flower.

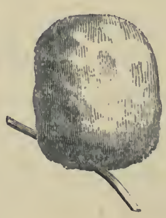

Fig. 52. Dried fruit.

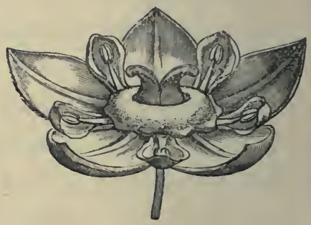

Fig. 50. Flower ($\frac{4}{1}$).

Microrhamnus, a prickly shrub of Texas, with small ericoid leaves, solitary flowers and an ovoid drupaceous finally dry fruit, with an osseous monospermous putamen and basilar cupule, has been associated with these; but in our opinion it is only a species of *Condalia* with the flower destitute of petals, an abnormal type (which might strictly constitute a separate series) whose axillary flowers, solitary or collected in small cymes, have a receptacle in the form of a hollow cup, lined with a thick flattened and pentagonal disk. The corolla is almost always wanting, and the ovary is reduced to a single cell into which a parietal placenta advances, forming an incomplete partition on each side of which is an ascending ovule, with the micropyle turned to the side of the placenta. The fruit is drupaceous. The *Condalias* inhabit the warm and temperate regions of the two Americas.

II. GOUANIA SERIES.

Gouania[1] (fig. 54) consists of *Rhamnaceæ* with an inferior ovary not free. The floral receptacle has the form of a sac in the concavity of which the adherent gynæcium is lodged, whilst the perianth and androecium are inserted near its opening above an epigynous disk with five alternipetalous lobes, often very prominent.[2] The triangular sepals, five in number, are valvate in the bud. With these alternate five small bowl-like petals sheltering in their concavity the superposed stamens. The latter are epigynous, formed of a free filament, inflexed in the bud, and a bilocular anther, with lateral or extrorse dehiscence, sometimes furnished with a salient glandular interior. The ovary has three cells, each containing one ovule of *Rhamnus*, and is surmounted by a style more or less deeply divided into three stigmatiferous branches. The fruit is completely inferior and crowned with the remains or scars of the perianth; it is a capsule with three cells and furnished with three wide vertical rounded wings. At the time of the separation of the fruit, these divide into three cocci, in such a manner that the latter are bordered with a thin half-wing. They are otherwise indehiscent and leave on the receptacle a slender columella which divides into six filaments. Each encloses an obovate seed compressed inwards, plano-convex, with a smooth, testaceous external envelope containing a scanty fleshy albumen and an axile embryo, with a short inferior radicle and broad rounded cotyledons, slightly flattened. The *Gouania* to the number of some thirty species,[3] inhabit the hottest regions of both worlds. They are generally climbing shrubs which attach themselves to neighbouring objects by tendrils representing sterile

Gouania domingensis.

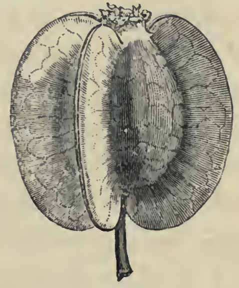

Fig. 54. Fruit ($\frac{3}{1}$).

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[1] Jacq. *Amer.* 261.—L. *Gen.* n. 1157.—J. *Gen.* 381.—Gærtn. f. *Fruct.* iii. 19.—Lamk. *Dict.* iii. 4; Suppl. ii. 819; *Ill.* t. 845.—DC. *Prodr.* ii. 38.—Ad. Br. *Rhamn.* 71. t. 5.—Endl. *Gen.* n. 5746.—B. H. *Gen.* 385, n. 35.—H. Bn. *Payer Fam. Nat.* 329.—Hook. *Fl. Ind.* i. 643. —Baker *Fl. Maurit.* 52.—*Retinaria* Gærtn. *Fruct.* ii. 187, t. 120, fig. 4.—*Nægelia* Zoll. et Moritz. *Verz.* 20.—Hassk. *Flora* (1852), 114.

[2] They may even rise along the internal face of the sepals, to which they adhere.

[3] Wight and Arn. *Prodr.* i. 166.—Wight,

branches or axes of inflorescence, spirally twisted. They are glabrous or oftener clothed with down. The leaves are alternate, petiolate, accompanied by two caducous stipules, entire or dentate, penninerved or triplinerved. The flowers[1] are axillary or terminal, and disposed in ears or simple or ramified clusters arranged in small cymes or glomerules.

Reissekia, climbing and cirriferous shrubs inhabiting Brazil, has the flowers of *Gouania*; but the fruit is furnished with three or four membranous wings, and the pedicellate flowers are disposed in numerous umbelliform cymes, in the axils of the leaves. *Crumenaria* has the flower and fruit of *Gouania*, with membranous and veined wings; but the organs of vegetation are quite different; for they are nearly all perennial herbs, with a thick, woody stock, from which proceed aerial reedy branches, leafless or bearing small alternate scanty leaves, accompanied by small ciliate stipules (which makes these plants the analogues of *Canotia* and *Stackhousia* among the *Celastraceæ*). The flowers are few in number on slender pedicels, and disposed in clusters of cymes. The *Crumenarias* are Brazilian plants. One of them is an annual, with membranous, oval, and trinerved leaves. *Helinus*, on the contrary, consists of sarmentous and hairy shrubs (Asiatic and African), like *Gouania* and *Reissekia*, but they differ from them as also from *Crumenaria*, in the absence of wings from the surface of the fruit, which is capsular, inferior, and the three cocci of which open along their internal angle, after they are detached from the columella.

Phylica (fig. 55, 56), which constitutes a sub-series by itself (*Phyliceæ*), differs in habit as much from *Gouania* and *Crumentaria* as these do from each other. Like many other plants from South Africa, to which this genus is limited, they are ericoid shrubs with alternate coriaceous and often linear leaves, covered with a down generally whitish. The woolly flowers are axillary, rarely disposed in cymes, oftener grouped in ears or terminal capitules. At the bottom of the very concave receptacle, as in the preceding genera, is a quite inferior adherent ovary, surmounted by an epigynous disk;

Icon. t. 974.—Tul. *Ann. Sc. Nat.* sér. 4, viii. 129 (*Guania*).—Seem. *Fl. Vit.* 43.—A. Gray, *Amer. Expl. Exp. Bot.* i. 282.—Griseb. *Fl. Brit. W.-Ind.* 101.—Tr. *loc. cit.* 381.—Thw. *Enum. Pl. Zeyl.* 75.—Oliv. *Fl. Trop. Afr.* i. 383.—Reiss. *Mart. Fl. Bras. Rhamn.* 102, t. 36-39.—Walp. *Ann.* i. 196; ii. 272; iv. 436; vii. 607.

[1] Small, white or yellowish.

and the fruit, equally inferior, conformed to that of *Helinus*, finally divides into three cocci dehiscing internally, but destitute of a columella. *Nesiota*, a shrub from the island of St. Helena, covered with a whitish down, has opposite broad and oval-oblong leaves, and flowers disposed in loose cymes. The fruit is that of *Phylica;* but from the superior opening of the deep sac formed by the receptacle emerges the summit of the pericarp proper, which represents a sort of small conical cover. In *Lasiodiscus*, of which two African species are known, one from the Western tropical region, the other from Madagascar, the leaves are also opposite, large, glabrous, and accompanied by wide and long pointed interpetiolate stipules, sometimes free, sometimes more or less connate in pairs, straight and imbricate with them, for some time persistent. The flowers in axillary cymes, the inferior ovary of which is surmounted by a style articulate at the base, are succeeded by a fruit equally inferior, depressed, slightly convex at the summit and areolate.

Phylica girida.

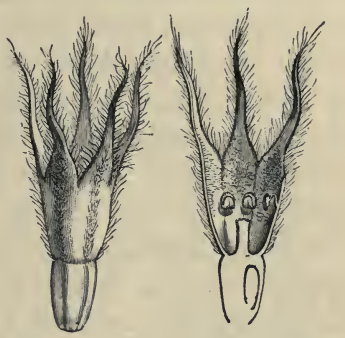

Fig. 55. Flower ($\frac{8}{1}$). Fig. 56. Long. sect. of flower.

Trymalium, Australian shrubs belonging to a distinct subseries, exclusively oceanic, has alternate leaves, generally tomentose, with a simple or stellate, whitish or rusty down. The inferior ovary is surmounted by an annular or 5-lobed disk, surrounded by coloured epigynous sepals, and petals in a hood capping an equal number of stamens. The fruit, inferior, capsular and dehiscent, like that of *Nesiota*, is generally surmounted by a conical projection which represents the summit of the ovarian cells; it is the same with that of *Pomaderris*, Australian and New Zealand shrubs, with numerous flowers generally disposed, like those of *Trymalium*, in great ramified groups of cymes; they are distinguished from *Trymalium* by the absence of petals or their being nearly flat, too little developed to cover the stamens which are superposed to them. *Spyridium* has the same flowers as *Pomaderris* and *Trymalium*, with a capsular fruit altogether inferior, stamens covered by the petals and flowers united in capitules accompanied by imbricate and persistent bracts. They are from extra-tropical Australia, as are also *Cryptandra* and *Stenanthemum.* But in these last two genera, the receptacle is prolonged in a neck above the ovary, before bearing the perianth and andrœcium. *Stenanthemum* is distinguished by its inflorescence which is that of *Spyridium*, whilst *Cryptandra* has sessile or shortly pedicellate flowers, surrounded at the base by brown persistent bracts. They are solitary along the small divisions of inflorescence or grouped in short ears, intermixed with leaves, but they are never seen disposed in capituliform cymes, as in *Spyridium*. Like many other genera of the same family, they are in other respects by no means clearly separated from each other.

III. COLLETIA SERIES.

In *Colletia*[1] (fig. 57), the flowers are regular and hermaphrodite. The perianth, often simple, petaloid,[2] has the form of a tube or small elongated bell, the cupuliform base of which, covered with a disk, supports the gynæcium, and its summit is divided into four or five valvate[3] lobes. In the hollows are sometimes inserted an equal number of small petals, superposed to which are as many stamens similarly inserted and formed of a free filament[4] and an introrse anther.[5] The two cells open by longitudinal clefts which often become confluent above. The cupule of the disk, about which there was recently some question, is occasionally thin and scarcely visible.[6] Oftener, its upper margin is incurved or involute on the side of the gynæcium. The latter consists of an ovary in great part free, but adnate to the concavity of the receptacle in its lower portion, trilocular, and surmounted by a style the stigmatiferous summit of which is dilated to a three-lobed head.[7] In each ovarian cell there is one ovule inserted at the base of the internal angle, with micropyle ascending and at first directed downwards and inwards but, as in *Rhamnus*, ultimately becoming more or less decidedly lateral.[1] The fruit, accompanied at the base by a receptacular cupule,[2] is a drupe, with thin mesocarp, finally dry, and formed of three cocci which separate and open in two valves to liberate each an albuminous seed, analogous to that of the Buckthorns, plano-convex, with a crustaceous testa. *Colletia* consists of shrubs from the temperate and cool regions (especially the western) of South America, often leafless or with very small leaves decussate, as also the axillary branches, often thickened, spinescent, vertically flattened and generally nearly triangular.[3] The flowers, axillary and solitary, or collected in few-flowered cymes, are situated under these axillary branches. A dozen species[4] are known. Formerly the genus included a much larger number; but it has recently been dismembered of a number of secondary genera which in other respects scarcely possessed the value of a section. Sometimes it happens that, the fruit separating into cocci as in *Colletia*, the disk is attached in the form of a cupule to the bottom of the perianth, and that the opposite and spinous branches are articulate, as in *Discaria*, natives of South America, New Zealand, and Australia; or the floral receptacle, less deep and obconical, its concavity lined with the disk, supports an open perianth with independent folioles, as in *Adolphia infesta*, a subaphyllous American shrub, with opposite and articulate spinous branches. In *Retanilla*, Chilian and Peruvian shrubs, spinous and leafless, the diminishing disk ascends the internal surface of the perianth, and the fruit is a drupe with a 1–3-celled putamen. The same fruit is observed in *Talguenea* and *Trevoa*, also from South America, but

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[1] Commers. ex J. *Gen.* 380.—Lamk. *Ill.* t. 129.—Poir. *Dict.* Suppl. ii. 311 (part.).—DC. *Prodr.* ii. 28 (part.).—Ad. Br. *Rhamn.* 58 (part.), t. 3.—Endl. *Gen.* n. 5730.—Miers, *Ann. Nat. Hist.* sér. 3, v. 203; *Contrib.* i. 251, t. 34–36.—B. H. *Gen.* 383, n. 28.—H. Bn. *Payer Fam. Nat.* 330.

[2] White, generally scented.

[3] These alone perhaps are the representatives of the calyx, the remainder belonging to the receptacle, and perhaps it is the same in the *Penæaceæ* and other neighbouring groups.

[4] Below the point where they become free, these filaments are traceable on the tube.

[5] Included or sometimes a little exserted.

[6] In the *Scypharia* (Miers. *Ann. Nat. Hist.* ser. 3, vi. 8; *Contrib.* i. 299, t. 42), placed here with some doubt.

[7] Sometimes at the swollen summit of the hollow style, six lobes may be observed, three of which, very small, alternate with the three larger.

Colletia cruciata.

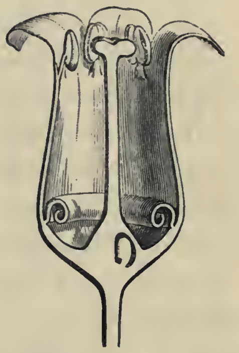

Fig. 57. Long. sect. of flower ($\frac{4}{1}$).

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[1] A double envelope.

[2] After floration, the perianth often detaches itself circularly above the interior projection of the disk and falls with the andrœcium.

[3] At least looked at in profile.

[4] H. B. K. *Nov. Gen. et Spec.* vii. 59.—SPRENG. *Syst.* i. 825 (*Condalia*).—HOOK. and GILL. *Bot. Misc.* i. 151, t. 43, 44; iii. 172.—VENT. *Jard. Cels.* t. 92—LINDL. *Journ. Hort. Soc.* v. 29, Ic.—C. GAY, *Fl. Chil.* ii. 28 (part.).—A. GRAY, *Amer. Expl. Exp. Bot.* i. 276.—WEDD. *Chl. Andin.* ii. 183.—*Bot. Mag.* t. 5033.—WALP. *Ann.* vii. 603.

they bear tolerably developed membranous leaves. They are 5-nerved in *Talguenea*, the fruit of which is enclosed in the receptacular cupule, and trinerved in *Trevoa*, the drupe of which is superiorly exserted. In the two latter genera, the calicinal petaloid sac is not accompanied by any glandular thickening constituting a distinct layer belonging to a disk.

The family *Rhamnaceæ* was proposed in 1814 by R. Brown.[1] An order of Buckthorns (*Rhamni*) is doubtless found in the *Genera* of A. L. de Jussieu;[2] but it is scarcely other than the family of Jujubes (*Zizyphi*) of Adanson,[3] with the name changed, and some genera of unicarpellar *Rosaceæ* which it contained removed. There remain then the *Staphyleæ*, the *Ilicineæ*, the *Celastraceæ*, the *Brunieæ*, certain *Rosaceæ* as *Carpodetus*, some *Corneæ* as *Aucuba*, some *Myrsineæ* as *Samara*, etc. R. Brown clearly established that his *Rhamneæ* should comprise only those of the *Rhamni* of Jussieu "which have the ovary more or less adherent to the tube of the calyx, sepals of valvate præfloration, and stamens equal in number and alternating with the sepals; an ovary of which each of the two or three cells contains one erect ovule; an erect embryo, generally situated in the axis of a fleshy albumen or entirely destitute of albumen; the petals to which the stamens are opposite, enveloping the anthers with their concave limb and sometimes wanting." Ad. Brongniart, in a special monograph[4] in 1826, adopted this family of *Rhamneæ* as conceived by R. Brown, and, after him, A. P. de Candolle,[5] and it then comprised nineteen genera still preserved, viz.: *Paliurus*, *Zizyphus*, *Condalia*, *Berchemia*, *Ventilago*, *Sageretia*, *Rhamnus*, *Scutia*, *Retanilla*, *Colletia*, *Hovenia*, *Colubrina*, *Ceanothus*, *Noltia* (*Willemetia*), *Pomaderris*, *Cryptandra*, *Phylica*, *Gouania* and *Crumenaria*. Ten years later, Endlicher,[6] imbibing the ideas of Reissek, to whom we are indebted for great labours on this family, divided it, after him, into six tribes, and adopted the two new genera *Cormonema* and *Alphitonia* of this author (to whom he dedicated a genus

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[1] *Flind. Voy.* ii. 554; *Misc. Works* (ed. Benn.), i. 26 (*Rhamneæ*).

[2] 376, Ord. 13 (1789).

[3] *Fam. des Pl.* ii. 297. Fam. 42 (1763).

[4] *Mémoire sur la Famille des Rhamnées* (*Ann. Sc. Nat.* sér. 1, x. 320).

[5] *Prodr.* ii. (1825), 19, Ord. 56.

[6] *Gen.* 1094, Ord. 239 (*Rhamneæ*).

Reissekia), as well as those his colleague Fenzl[1] had just established, viz. *Trymalium* and *Spyridium*, also *Helinus* E. Mey., till then remaining in manuscript in herbaria, *Ochetophila* of Poeppig, *Discaria* of W. Hooker,[2] *Karwinskia* of Zuccarini,[3] *Adolphia* of Meissner,[4] and *Talguenea* observed in Chili by Miers.[5] The latter, revising in a detailed monograph the entire group of *Colletieæ*,[6] which then comprised five genera, retains a sixth, *Trevoa*, established at the same time as *Talguenea*. The number of genera is thus raised to thirty-one. Reissek, studying this family for the *Flora Brasiliensis*,[7] found there another new type, *Rhamnidium;* he afterwards established the Australian genus *Stenanthemum*.[8] All are adopted in his *Genera* by J. Hooker,[9] who, in the same work, creates the two African types *Nesiota* and *Lasiodiscus*, and revives the old generic name *Sarcomphalus* P. Br. With him, then, the *Rhamnaceæ* number thirty-seven genera, including *Smythea* of Seemann,[10] and *Microrhamnus* of A. Gray,[11] with us only a *Condalia* with a corolla. The genera *Emmenosperma* of F. Mueller[12] and *Macrorhamnus*, which we have just proposed,[13] complete the total of thirty-eight. This number is probably too great, regard being had to the species known. It consists of a group very closely natural in most of its parts, the generic differences of which are frequently of small value; and it is probable that a certain number of genera actually retained may disappear as intermediate species are observed which may serve as natural links between many of them.[14]

Whatever may be the limits of the genera, those of the tribes hitherto adopted have been singularly effaced by the most recent discoveries. The *Colletieæ* represent the series best characterised by habit and organisation of perianth, but among them, *Adolphia* has been signalised[1] as having sensibly the flower and fruit of *Colubrina*. This latter genus presents an ovary inferior and, as authors understand, really "adherent" in the greatest portion of its extent. By that, it approaches many of the types with a totally inferior ovary as *Reissekia*. This is distinguished only by its fruit, equally inferior in its entirety, whilst the receptacular cupule of *Colubrina* and analogous genera finally envelops only a more or less considerable portion of the pericarp. In other respects *Reissekia*, in habit, foliage and cirri, is very closely allied to other types of the *Gouanieæ* series; but it has not the winged fruit; which also deprives the last character of much of its importance. For these reasons, we have been compelled to withdraw from these external characters, borrowed from habit, leaves and pericarp, a great part of the value which has generally been attributed to them, and to reduce the series distinguishing this family to the three following.

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[1] *Enum. Pl. Hueg.* (1837).

[2] *Bot. Misc.* i. (1830).

[3] *Plant. Nov. Fasc.* i. (1832).

[4] *Gen.* 70 (1836–1843).

[5] *Trav. in Chil. and la Plata*, ii. (1826).

[6] *On the tribe Colletieæ, with some Obs. on the Seed in .... Rham.* (*Ann. Nat. Hist.* ser. 3, v. 76; *Contrib.* i. 230, t. 33–24).

[7] *Mart. Fl. Bras. Rhamn.* (1861).

[8] *Linnæa*, xxix. (1857–58).

[9] *Gen.* 371, Ord. 49 (1862).

[10] *Bonplandia* (1861).

[11] *Pl. Wright.* p. i. (1852).

[12] *Fragm. Phyt. Austral.* iii. (1862–63).

[13] *Adansonia*, xi. (1874).

[14] For example the various genera of the group *Colletieæ*. Among the *Rhamneæ*, the *Alphitonias* seemed at first to constitute a perfectly distinct genus. Now that we know better certain *Colubrinas* with a ferruginous down, smooth seeds persisting on the placenta after the fall of the cocci, and an ovary presenting the same adherence, the distinction between the two genera becomes scarcely appreciable. The fruit of *Nesiota* once known, this type becomes very difficult to separate otherwise than as a section of *Phylica* with broad whitish leaves, etc.

1. RHAMNEÆ.—Flowers with concave receptacle, cupuliform or much deeper, lined with a thin disk covering its internal surface, or with a thick annular disk which fills it, either around the ovary, or above it. Perianth and andrœcium, perigynous or epigynous, inserted on the margin of the receptacular cup. Ovary free or more generally united, inferiorly or to a very variable, sometimes even to almost its entire extent, with the receptacle and disk which covers it, but free in an upper portion however small, which always grows and becomes independent of the receptacle in the fruit.[2] Fruit dry or drupaceous, indehiscent or dehiscent, sometimes surmounted by a vertical wing. Seed sometimes (*Ventilagineæ*) destitute of albumen. —20 genera.

2. GOUANEÆ.—Flowers with very concave receptacle, in form of a sac like a gourd or narrow-necked bottle, covered above the inferior (and adherent) ovary with an epigynous disk, occasionally very restricted or nought. Fruit inferior, crowned with the remains or scars of the calyx, enveloped[3] with the receptacular sac, finally dry and divided, with cocci dehiscing within the fruit.—12 genera.

3. COLLETIEÆ.—Flowers with cupuliform receptacle, prolonged above to a thin and coloured tube the summit of which is divided into

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[1] A. GRAY, *Pl. Wright*, p. i. 34.

[2] So that the base of the latter is accompanied to a very variable height by a small tablet or frame of a capule with cicatrised margins cut straight and representing even the contour of the receptacle.

[3] Except the extreme summit which often protudes in *Pomaderris Trymalium*.

calycinal lobes. Petals none or inserted at the bottom of the hollows which separate these lobes. Disk lining the receptacular cupule and not extending beyond it or rising more or less high along the tube (sometimes none or nearly so). Ovary free, except at base adnate to receptacular cupule. Fruit with dehiscent or plurilocular putamen.—Shrubs with decussate branches, often thickened and spinous, leaves opposite, often very reduced or none.—6 genera.

The thirty-eight genera are very unequally distributed over a vast extent of the globe. Eight of them are met with in both worlds, thirteen are limited to America, and consequently seventeen belong exclusively to the old world. The *Buckthorn* extends over the widest area and alone has been observed in all parts of the world. In Oceania, it is true, it is represented by a very small number of species, often doubtful; but it extends over nearly the whole of America, and, in the old world, from the Cape to the North of Europe, a belt of about 70°. On the other hand, there are genera of very limited area, as *Crumenaria* and *Reissekia*, which are exclusively Brazilian, *Helinus* and *Noltia*, special to South Africa, and *Nesiota*, confined to the island of St. Helena, where, like many other shrubby species, it will doubtless soon cease to exist. The *Trymalieæ* are all Oceanic, and the *Phyliceæ* are observed only in South Africa and Madagascar; *Macrorhamnus* belongs to this island. On the contrary there are two distinct centres of vegetation, one in the old world and the other in America, for *Berchemia*, *Sageretia*, *Scutia*, *Colubrina*, *Gouania*, and *Discaria*. The greater part of these latter, however, are American, as also the five other genera of *Colletieæ*. In Europe, the family is represented only by the two genera *Buckthorn* and *Jujube*.

The affinities of the *Rhamnaceæ* are in great part established by a knowledge of the mode of composition of JUSSIEU's family of Buckthorns from which they have been detached. The *Celastraceæ* formed the greater portion of this group, and they might appear very far removed from the genera of *Rhamnaceæ* then known, because the latter have a concave receptacle, lined with a disk more or less thick, and in the bottom of this receptacular the gynæcium is inserted, while a perianth and a perigynous andrœcium are inserted on its margin. In this the *Rhamneæ*, as perceived by

Adanson and admitted by many authors after him, closely approach the *Rosaceæ* with concave receptacle and single ovary. The *Celastraceæ*, on the contrary, at least those which had then been studied, presented a receptacle, either convex or much less concave, and their insertion was nearly that of a great number of hypogynous types. Again, it was thought that the micropyle, exterior in the ascending ovule of the *Celastraceæ*, became constantly interior in that of the *Rhamnaceæ* when it had the same direction. But the study of a large number of more recently discovered types conclusively proves that these two great differential characters between the two groups are not at all constant. In *Perrottetia* (notably in *Caryospermum*), *Frauenhofera* and in many other genera of the *Celastraceæ*, especially in certain *Mortonias*, the concavity of the receptacle and the mode of insertion of the perianth and andrœcium become evidently what they are in a great number of the *Rhamnaceæ*, and it has been truly said that apart from the situation of the stamens, the flowers of these *Celastraceæ* were altogether those of *Rhamnaceæ*. It might be added that the habit, the foliage, the inflorescence, the fruit, the direction of the seed, might be in one point or another identical. Under these circumstances, to separate the two families, there remains only the oppositipetalous character of the stamens in the *Rhamnaceæ*, invariably alternipetalous in the *Celastraceæ*, a character which we admit to be sufficient, although it would not be so in other natural groups, since we retain the two families as distinct; but we maintain[1] this consequence of what has just been established: "that the *Rhamnaceæ*, oftener perigynous or epigynous than the *Celastraceæ*, but not constantly, might strictly and justly be considered a series with oppositipetalous stamens." This character suffices to distinguish them from a great number of other families, especially from those which constituted the Buckthorn Order of Jussieu. Ad. Brongniart[2] has completely differentiated them. The *Ilicineæ*, whose corolla is most often gamopetalous and which, in their descending seed with micropyle interior and superior, have an abundant albumen, with a small apical embryo, are neighbours of the *Ebenaceæ* and *Sapotaceæ*.[3] The *Staphyleæ*, studied in the family of *Sapindaceæ*,[4] have neither the andrœcium nor the ovarian cells always uniovulate or biovulate, nor the invariable simple leaves of the *Rhamnaceæ*. The *Brunieæ*, by us referred to the family of the *Saxifragaceæ*, have certainly the concave receptacle of most of the *Rhamnaceæ;* but besides their stamens being alternate with the petals, the latter are developed, and the ovarian cells, often incomplete, enclose one or many descending ovules. Other *Saxifragaceæ*, as the *Hamamelideæ* and the *Codieæ*, very closely allied to the *Brunieæ*, resemble also certain *Rhamnaceæ*, but they have likewise alternipetalous stamens and at least two descending ovules in each cell. The *Santalaceæ*, with oppositipetalous stamens, like the *Rhamnaceæ*, have the ovules inserted on a placenta centrally free, or descending in ovarian cells more or less incomplete.[1]

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[1] *Adansonia*, xi. 273.

[2] *Rhamn.* 11.

[3] DC. *Théor. Elém* (éd. 1), 217.

[4] *Nat. Hist. of Plants*, v, 342, 392.

Uses.[2]—What we have said of the close affinities of the *Celastraceæ* and *Rhamnaceæ* agrees with what is known of the properties of both. The latter are bitter, acrid and astringent. According to the species or parts used, the *Rhamnaceæ* furnish evacuant or tonic and febrifuge medicines. They are also frequently rich in colouring matters, many of which are employed in the arts. Their wood is analogous in structure and qualities to that of most of the *Celastraceæ*. The *Buckthorns* are, in our country, the most active of the *Rhamnaceæ* employed in medicine. The drupaceous fruit of *Rhamnus cartharticus*[3] (fig. 39–41), wrongly designated as Buckthorn berries, is especially used in country districts as an energetic purgative. They have been employed as hydragogues; they have the inconvenience of greatly irritating the intestinal mucous membrane, producing violent colic and sometimes vomiting. They are generally prescribed in the form of a syrup prepared with the green, bitter and nauseous pulp. They are frequently given to animals. Several other species of *Rhamnus* might be substituted for this one, particularly the Alder,[1] the fruit of which is employed in veterinary medicine; Alaternus,[2] *R. saxatilis*,[3] *infectorius*,[4] *alpinus*,[5] *pumilus*[6] (fig. 42). The internal bark of these plants has the same properties, but is less used. Its extreme acridity in certain species, as *R. Frangula* and *sanguineus*, causes it to be sought after for the treatment of scab in man and animals. Nearly all are tinctorial. According to the degree of maturity, their fruits furnish various substances yellow or green. Those of *R. infectorius* may be substituted for the Weld or Yellow-weed of dyers. From them, as likewise from those of *R. saxatalis*, *Alaternus*, *oleoides*,[7] *buxifolius*[8] and *amygdalinus*,[9] the *still de grain*, a yellow colour used by painters, is prepared. The Chinese green or *lo-kao*, so highly esteemed, is extracted from two species of *Rhamnus*, which Decaisne considered should be described as new, under the names of *R. chlorophorus* and *R. utilis*.[10] Some parts of the Buckthorns have been described as astringent, particularly the leaves of *Alaternus*. From the branches is prepared a charcoal sometimes used in the manufacture of powder and resembling that of *Euonymus*. Those of *Paliurus australis*[11] (fig. 49) furnish firewood in the south of Europe, where this shrub is planted to form impenetrable hedges. Very solid canes are made from them, on the thorns of which figs are exposed to dry. The seeds, formerly extolled for cough, have been used for dressing burns.[1] A decoction from the crushed fruit is prescribed for chronic diarrhœa, laxity, and as a diuretic. It is, in fact, an astringent plant; its root serves for the same purposes. There are many other *Rhamnaceæ* which likewise contain tannin and are astringent. *Sageretia theezans*,[2] which supplies the place of tea as a beverage for the Chinese poor, owes its qualities in a great measure to its slight astringency. *Colubrina asiatica*[3] is employed in Polynesia as a local remedy for wounds, hastening their cicatrisation. In Chili *Trevoa trinervis*[4] has the reputation of curing wounds and abscesses. *Discaria febrifuga*[5] owes its specific name to the fact that the Brazilians consider it salutary in the treatment of tertiary fevers. In Rio Janeiro, especially, a bitter extract of the bark is employed as a tonic and digestive. In Brazil again, *Condalia infectoria*,[6] a tan-bearing plant, is used to dye black and brown. In Chili *Retanilla Ephedra*[7] and *obcordata*[8] are also considered astringent and tonic. *Gouania domingensis*[9] (fig. 54), of the Antilles, has analogous properties. A stomachic and tonic juice is extracted from its fruit. From its bitter wood, reputed as antiseptic, a dental cure is prepared, the use of which, it is said, hardens the gums. The North American *Ceanothus* is also frequently sought after, as an astringent. *C. americanus*[10] from the leaves of which a digestive infusion, under the name of New Jersey tea, is prepared, has a reddish, bitter, tinctorial root, extolled by the Indians as a sovereign remedy against fevers, aphtae, angina, syphilitic accidents, dysentery and the ulcerations of scarlatina. *C. discolor*[11] has an astringent bark, and is equally an antidote to intestinal flux.[12] Beside these properties others are noted which oft appear contradictory. *Colletia spinosa*[1] passes in Chili and Brazil as a purgative wood from which is prepared a tincture, prescribed against fever fits, under the name of *estratto alcoholico de Quina*. *C. cruciata*[2] (fig. 57), *ferox*[3] and *Cruzerillo*[4] are employed by Chilian physicians as purgatives; it is the wood that is used. *Berchemia lineata*[5] is reputed in China as a hydragogue; its roots chiefly are useful in the treatment of dropsy. *Hovenia dulcis*[6] is, in the same country and in Japan, considered salutary in asthma. The over-developed axes of the inflorescence, which become succulent at the period of the maturity of the fruit (fig. 45), are especially used. They are eaten with pleasure, their flavour being nearly that of dried grapes. They are believed to dissipate drunkenness produced by the abuse of *saki*, a kind of beer prepared from fermented rice. In Abyssinia, *Rhamnus inebrians*[7] forms part of a kind of beer (mead) in which its bitter bark supplies the place of hops. In Guyana *Colubrina fermentum*[8] owes its name to the part in fermentation played by its bitter bark in sweet liquids to which it is added. In Hindostan, an ointment is prepared from the leaves of *Scutia circumcissa*,[9] the application of which is supposed to hasten accouchement.

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[1] In their organs of vegetation, the *Rhamnaceæ* are sometimes very similar to certain *Euphorbiaceæ*, such as *Bridelia*. On the structure of the wood of the *Rhamnaceæ*, see:—Crueger, *Bot. Zeit.* (1850), 126 (*Gouania*).—Carpent. *Microsc.* 433, c. fig.—Oliv. *Stem. Dicot.* 11.

[2] Endl. *Enchirid.* 582.—Lindl. *Fl. Med.* 165; *Veg. Kingd.* 582.—Guib. *Drog. Simpl.* éd. 6, iii. 535.—Rosenth. *Syn. Pl. Diaphor.* 798, 1151.

[3] L. *Spec.* 279.—DC, *Prodr.* ii. 24, n. 9.—Mer. et Del. *Dict. Mat. Méd.* vi. 54.—Guib. *op. cit.* 537, fig. 722.—Berg et Schm. *Darst. Off. Gcw.* t. 16, e.—*Cervispina cathartica* Mœnch. *Meth.* 686.—*Spina alba* Lonic.—*S. infectoria* Matth. (*Noirprun, Bourg-épine, Quemot, Epine de Cerf*).

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[1] *R. Frangula L. Spec.* 280.—DC. *Prodr.* n. 30.—Duham. *Arbr.* (éd. 2), iii. t. 15.—Gren. et Godr. *Fl. de Fr.* i. 338.—Berg. et Schm. *Darst. Off. Gew.* t. 19, f.—Caz. *Pl. Méd. Ind.* (éd. 3), 208.—Rev. *Fl. Méd. du* XIXe *Siècle*, i. 193.—*Frangula vulgaris* Reichb. *Fl. Exsc.* 488 (*Bourdaine, Aune Noir, Rhubarbe des Paysans, Pouverne* .

[2] *R. Alaternus* L. *Spec.* 281.—DC. *Prodr.* n. 1. Duham, *op. cit.* 42, t. 14.—Mér. et Del. *Dict. Mat. Méd.* vi. 54.—H. Bn. *Dict. Encycl. Sc. Méd.* ii. 384.—*Alaternus Phylica* Mill. *Dict.* n. 1. Dambourney has employed the branches and leaves to dye wool and cotton. The fruit gives sap-green.

[3] L. *Spec.* 1671.—Jacq. *Fl. Austr.* t. 53.—DC. *Prodr.* n. 12; *Fl. Fr.* iv. 623.—Gren. et Godr. *Fl. de Fr.* i. 336.

[4] L. *Mantiss.* 49.—DC. *Prodr.* n. 12.—Gren. et Godr. *Fl. de Fr.* i. 336.—Lindl. *Fl. Med.* 167.—Guib. *op. cit.* 538.—*R. tinctorious* Mut. (*Petit-Nerprun, Epine puante*).—*R. tinctorius* Waldst. et Kit. (*Pl. Rar. Hung.* iii. t. 255;—DC. *Prodr.* n. 11), considered as a very distinct species, has, however, the same properties.

[5] L. *Spec.* 280.—Gren. et Godr. *Fl. de Fr.* i. 336.—*Alaternus alpinus*, Mœnch.

[6] L. *Mantiss.* 49.—Gren. et Godr. *Fl. de Fr.* i. 337.

[7] L. *Spec.* 279.—Desf. *Fl. Atl.* i. 197.—Gren. et Godr. *loc. cit.* 337.

[8] Poir. *Dict.* iv. 463.—DC. *Prodr.* n. 15.

[9] Desf. *Fl. Atl.* i. 198.

[10] *Compt. Rend. Acad. Sc.* xliv. 1141. The former (*Pa-bi-lo-za* of the Chinese) is the *R. hirsutus* of India. The latter (*Hom-bi-lo-za*) seems applied to as many forms as are obtained from *R. catharticus*.

[11] Rœm. et Sch. *Syst.* v. 342.—Gærtn. *Fruct.* i. 203, t. 43.—*P. aculeatus* Lamk. *Ill.* t. 210.—Duham. *op. cit.* iii. t. 17.—DC. *Prodr.* ii. 22.—*P. vulgaris* Don.—*Rhamnus Paliurus* L. *Spec.* 281.—*Zizyphus Paliurus* W. *Spec.* 1, 1103 (*Argalou, Arnavaou, Capelet, Porte-chapeau, Chapeau d'évéque, Epine noire, E. de Christ*). It is supposed that its branches formed the crown of thorns of Christ.

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[1] MIERGUES, *Bull. Soc. Bot.* i. 216.—ROSENTH. *op. cit.* 798 (Παλίουροσ DIOSC.).

[2] AD. BR. *Rhamn.* 53.—*Rhamnus theezans* L, *Mantiss.* 207.—H. B. K. *Nov. Gen. et Spec.* vii. 54, not.—DC. *Prodr.* ii. 26, n. 38.—*R. Thea* OSB. *It.* 232.

[3] AD. BR. *Rhamn.* 62.—*Ceanothus asiaticus* L. *Spec.* 284.—LAMK. *Ill.* t. 129.—DC. *Prodr.* ii. 30, n. 7.—*Tubanthera* COMMERS. (*Toutou* of the Polynesians).

[4] MIERS. *Trav. Chil.* ii. 529; *Contrib.* i. 291, t. 40 A.

[5] MART. *Syst. Mat. Med. Bras.* 37.—REISS. *Mart. Fl. Bras. Rhamn.* 101, t. 35 (*Kina of Brazil*).

[6] REISS. *loc. cit.* 90, 24.

[7] AD. BR. *Rhamn.* 58.—MIERS, *Contrib.* i. 287.—*Colletia Ephedra* VENT. *Choix de Pl.* t. 16.

[8] AD. BR. *loc. cit.* t. 3.—*Colletia obcordata* VENT. *Choix de Pl.* t. 16.

[9] L. *Spec.* ed. 2, 1663.—DC. *Prodr.* ii. 39, n. 2.—ROSENTH. *op. cit.* 806.—*C. glabra* JACQ. *Amer.* t. 179, fig. 40.—*Banisteria lupuloides* L. *Spec.* ed. 1, 427.

[10] L. *Spec.* 284.—MILL. *Icon.* t. 57.—SIMS. *Bot. Mag.* t. 1479.—DC. *Prodr.* ii. 31, n. 23.—LINDL. *Fl. Med.* 166.—ENDL. *Enchirid.* 583.—ROSENTH. *op. cit*, 804.

[11] VENT. ex ROSENTH. *op. cit.* 845.

[12] *C. cæruleus* LAGASC. *Gen. et Sp.* 11.—*C. azureus* DESF. *Cat. Hort. Par.* (1815), 232.—DC. *Prodr.* n. 21.

The drupaceous fruits of the Jujubes appear very different in their properties from the preceding genera. The pulp is sweet, mucilaginous, scented, slightly acid or astringent. It is considered pectoral, and should form part of Jujube paste, but gum and some aromatic substances are too often substituted. The true Jujubes of commerce are the fruit of *Zizyphus vulgaris*[10] (fig. 50–53), a Syrian species, now cultivated in the Mediterranean region of Europe. *Z. Jujuba*,[11] a species considerably different, belonging to India and

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[1] Lamk. *Ill.* ii. 90, t. 129.—*C. horrida* W. *Spec.* 1113.—Vent. *Jard. Cels.* 92.

[2] Gill. and Hook. *Bot. Misc.* i. 52, t. 43.—Miers, *Contrib.* i. 256, t. 34, E.—*Condalia paradoxa* Spreng. *Syst.* i. 825.

[3] Gill. and Hook. *Bot. Misc.* i. 154, t. 44 B.

[4] Bert. ex Rosenth. *op. cit.* 805.

[5] DC. *Prodr* ii. 23, n. 2.—*Rhamnus lineatus* L. *Amœn.* iv. 308.—Osb. *It.* 249, t. 7.

[6] See p. 78, note 3.

[7] R. Br. *List of Abyss. Pl.* (1814); *Misc. Works* (ed. Benn.), i. 94.—*R. Staddo* A. Rich. (*Sadoo* on the Tigris). *R. paucifolius* Hochst. (*Guecho* of the Abyss.) has the same properties.

[8] Rich. ex Endl. *Enchirid.* 583.—Rosenth. *op. cit.* 805.

[9] *S. indica* Ad. Br. *Rhamn.* 56.—*Rhamnus circumcissus* L. f. *Suppl.* 152.—*Ceanothus circumcissus* Gærtn. *Fruct.* ii. 111, t. 106.

[10] Lamk. *Dict.* iii. 316; *Ill.* t. 185, fig. 1.—DC. *Prodr.* ii. 19, n. 1.—Lindl. *Fl. Méd.* 165.—Mér. et Del. *Dict. Mat. Méd.* vii. 1010.—Rev. *Fl. Méd du* XIXe *Siècle*, ii. 185.—Gren. et Godr. *Fl. de Fr.* i. 334.—Caz. *Pl. Médic Indig.* (éd. 3), 542.—Guib. *op. cit.* iii. 536, fig. 721.—*Z. sativa* Desf. *Arbr.* ii. 873.—Duham. *op. cit.* iii. t. 16 (not Gærtn.).—*Rhamnus Zizyphus* L. *Spec.* 382 (*Chicourlier*, *Guindourlier*, *Epine à cerises*, *Croc de chien*).

[11] Lamk. *Dict.* iii. 318.—DC. *Prodr.* n. 21.—*Rhamnus Jujuba* L. *Spec.* 282 (*Kool*, *Bier*, *Bengha*).

China,[1] bears alimentary fruit, but it does not reach this country; and, besides, though edible, it is much less sweet and agreeable to the taste than our true jujubes. They are to the Indians what the drupes of *Z. Lotus*,[2] the *Sada* of the Africans, and, according to Desfontaines, the tree Lotus of the ancients, are to the lotus-eating tribes of Lybia. In Egypt and Arabia the fruit of *Z. Spina Christi*[3] is eaten; in Senegambia those of *Z. mucronata*,[4] and *Z. orthacantha*[5]; in India those of *Z. napeca*,[6] *Nitida*,[7] and *Œnoplia*;[8] in Cochin China that of *Z. agrestis*[9], and that of *Z. mauritiana*[10] in Mauritius. The fruit of the Indian *Z. Xylopyrus*[11] is insipid and not agreeable. That of *Z. Joazeiro*[12] is but little appreciated in Brazil, although the shepherds refresh themselves with it in very hot weather; its leaves are prized by small cattle; its bitter and astringent bark is a cure for ague. In the Philippine islands *Z. exserta*[13] is used for the treatment of skin diseases and syphilis. *Z. Sororia*[14] is also recommended for the same affections in India. *Z. soporifera*,[15] of northern China, owes its name to the fact that the decoction of its kernels calms grief and procures refreshing sleep to invalids. Some species of *Zizyphus* have, besides, oleaginous, acrid, and purgative seeds, as *Z. Œnoplia*, *Napeca*, and perhaps some others. The indigenous *Rhamnaceæ* rarely have a wood of good quality. That of the Privet is sometimes employed by toy and cabinet-makers; it is especially used to heat ovens, as also that of *R. catharticus*, of the branches of which canes imitating those of the Hawthorn are made. The Mongols cut idols of small size from the wood of *R. lycioides*.

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[1] *Z. chinensis* Lamk. (*Dict.* iii. 318) is doubtless, like many of the following species, a var. of *Z. vulgaris*.

[2] Lamk. *Dict.* iii. 316.—DC. *Prodr.* n. 3.—Ad. Br. *Rhamn.* 40.—*Rhamnus Lotus* L. *Spec.* 281.—Desf. *Act. Acad. Par.* (1788), t. 21 (*Jujubier* of the *Lotophagi*).

[3] W. *Spec.* 1105.—DC. *Prodr.* n. 6.—Desf. *Fl. Atl.* i. 201.—Hemsl. *Oliv. Fl. Trop. Afr.* i. 380.

[4] W. *Enum.* 251.—Harv. and Sond. *Fl. Cap.* i. 475.—*Z. Baclei* DC. *Prodr.* n. 8.—Guill. et Perr. *Fl. Sen. Tent.* i. 144, t. 37.—*Z. mitis* A. Rich. *Fl. Abyss. Tent.* i. 137.

[5] DC. *Prodr.* n. 20. Guill. et Perr. *Fl. Sen. Tent.* i. 145.—Perhaps a var. of *Z. Jujuba* Lamk.

[6] W. *Spec. Plant.* 1104.—DC. *Prodr.* n. 7.—*Rhamnus Napeca* L. *Spec.* 282. (not Forsk.).

[7] Roxb. ex Rosenth. *op. cit.* 801.

[8] Mill. *Dict.* n. 3.—DC. *Prodr.* n. 18.—*Rhamnus Œnoplia* L. *Spcc.* 282. (See Burm. *Thes. Zeyl.* t. 61).

[9] Schult. *Syst.* v. 341.—*Rhamnus agrestis* Lour. *Fl. Cochinch.* (ed. 1790), 158 (*Cay-na*).

[10] Lamk. *Dict.* iii. 319.—DC. *Prodr.* n. 27.

[11] W. *Spec.* ii. 11 (not Hochst).—*Rhamnus Xylopyrus* Retz. *Obs.* ii. 11.

[12] Mart. *Reis.* ii. 581.—Reiss. *Mart. Fl. Bras. Rhamn.* 86, t. 24, 27.

[13] DC. *Prodr.* n. 29.—*Z. trinervis* Poir. *Dict.* Suppl. iii. 192.—*Rhamnus trivernis* Cav. *Icon.* t. 505, fig. 1 (not Roth).

[14] Schult. *Syst.* v. 337.—DC. *Prodr.* n. 22.—*Z. trinervius* α Roth (perhaps a var. of *Z. Jujuba*).

[15] Schult. *loc. cit.* 340.—*Rhamnus soporifer* Lour. *Fl. Cochinch.* 158 (*Soan-tsâo*).

In many parts heels of shoes and matches are made of the wood of *R. frangula*, otherwise very indifferent and more generally employed for heating and for the manufacture of charcoal, a constituent of gunpowder. The wood of the common Jujube is sometimes employed in turnery. At the Cape, *Scutia capensis*[1] furnishes a hard and durable wood, and that of *Rhamnus celtifolia*[2] serves to make axletrees, yokes, and barrels. In India the textile bark of *Ventilago maderaspatana*[3] (fig. 46, 47) is used to make mats and string, remarkable for their tenacity and durability. *Colubrina reclinata*[4] and *ferruginosa*[5] of the Antilles have exceptionally a wood so hard that they constitute one of the *iron woods* of this country. The sharp spines of *Discaria Toumatou*[6] served as tattooing needles to the savages of New Zealand. Several *Rhamnaceæ* are ornamental. There are seen in our gardens many Buckthorns with beautiful persistent leaves; Jujubes; *Paliurus australis*, a very elegant plant; charming *Ceanothus* with white, pink, or blue flowers; and in our greenhouses and orangeries *Pomaderris*, *Trymaliums*, *Phylicas*, *Cryptandras*, having sometimes the foliage and habit of the Heaths, and requiring nearly the same kind of culture; *Hovenia dulcis*, in its foliage and odorous flowers much resembling certain *Tilias*, and bearing our mild winters as well as *Colletia cruciata*, remarkable for the enormous development of its spinescent branches.

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[1] *Rhamnus capensis* THUNB. *Prodr.* i. 44; *Fl Cap.* ii. 73.—*Ceanothus capensis* DC. (syn? of *S. Commersoni* AD. BR.).—HARV. and SOND. *Fl. Cap.* i. 477 (*Katdoon*).

[2] THUNB. ex ROSENTH. *op. cit.* 1154.

[3] GÆRTN. *Fruct.* i. 223, t. 49.—DC. *Prodr.* i. 38.—ROSENTH. *op. cit.* 798.

[4] AD BR. *Rhamn.* 62.—*Ceanothus reclinatus* LHÉR.

[5] AD. BR. *loc. cit.*—*Rhamnus colubrinus* L.—*Ceanothus colubrinus* LAMK.

[6] RAOUL. *Choix de Pl.* 29.—HOOK. F. *Man. N.-Zeal. Fl.* 30..—*Notophæna Toumatou* MIERS *Contrib.* i. 272, t. 37, F.

GENERA.

I. RHAMNEÆ.

1. **Rhamnus** T.—Flowers hermaphrodite or polygamo-diœcious; receptacle very concave, obconical or urceolate, lined with a thin or more rarely somewhat thickened disk entire at apex. Sepals 4, 5, 3-angular, valvate, inserted at margin of receptacle. Petals 4, 5, (or sometimes 0), small, cucullate, or flat. Stamens same in number oppositipetalous, inserted with perianth; filaments short; anthers introrse, 2-rimose. Germen inserted at base of receptacle (in male flower effete rudimentary), free, 3–4-locular; style erect, at apex more or less deeply 3–4-lobate or ramose stigmatose. Ovule in cells 1, suberect; micropyle introrsely inferior, finally more or less lateral. Fruit drupaceous, spherical or oblong, girt at base with very short annular scar of receptacle; pyrenæ 2-4, osseous or cartilaginous, finally obscurely dehiscent within or opening at base, oftener indehiscent. Seeds obovate compressed or sulcate, sometimes dilated at base to a short aril, albumen fleshy (sometimes 0); cotyledons of straight embryo flat or recurved at margin, foliaceous or fleshy; radicle inferior short.—Trees or shrubs; leaves alternate subopposite (deciduous or persistent) petiolate, entire or dentate; stipules lateral small, deciduous; flowers axillary in simple fasciculate or ramosely compound cymes. (*All warm and temp. regions.*) See p. 52.

2. **Rhamnidium** Reiss.[1]—Flowers nearly of *Rhamnus;* receptacle subturbinate or shortly obconical, lined with a disk. Perianth

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[1] *Mart. Fl. Bras. Rhamn.* 94, t. 31.—B. H. *Gen.* 378, n. 11.

and stamens of *Rhamnus*. Germen free, immersed in disk; cells 2, 1-ovulate. Fruit ovoid baccate (or sometimes drupaceous ?), apiculate to base of style and girt at base with cupular receptacle, finally corticate subdry, indehiscent; endocarp membranous, 1–2-locular. Albuminous seeds and other characters of *Rhamnus*.—Shrubs; leaves opposite or subopposite entire, with very closely lineate nerves; stipules small, deciduous; flowers[1] crowded in axillary subsimple or fasciculate cymes.[2] (*Trop. and South America.*[3])

3 ? **Macrorhamnus** H. Bn.[4]—Flowers hermaphrodite; petals 5, subfree (?). Petals and stamens... ? Germen free, 3-locular. Fruit shortly ovoid drupaceous; exocarp[5] separable; lobes 3, at apex 2-fid; endocarp woody 3-coccous; cocci separable, parting elastically inwards. Seeds in cocci solitary suberect exarillate obovate much compressed; testa crustaceous nitid; exalbuminous embryo and other characters of *Rhamnus*.—A glabrous shrub; branches nodose at leaves; leaves subopposite or alternate ovate penninerved, at base, sub-5–7-nerved reticulate-veined; flowers axillary solitary (?); fructiferous peduncles curved.[6] (*Madagascar.*[7])

4. **Karwinskia** Zucc.[8]—Flowers of *Rhamnidium*; germen free, immersed in disk; cells 2, 3, incomplete; ovules in each 2, ascending. Fruit of *Rhamnidium* (glandulous); putamen 1, 2-locular. Seeds in cells solitary obovoid; testa verrucose (dark coloured); albumen thin; cotyledons of erect embryo ovate fleshy.—Shrubs; leaves opposite or subopposite oblong penninerved punctulate; stipules membranous, deciduous; flowers in axillary cymes, oftener pedunculate in pairs.[9] (*North and West. South America.*[10])

5. **Emmenosperma** F. Muell.[11]—Flowers (nearly of *Rhamnus*) polygamous; receptacle obconical or campanulate, lined with thin

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[1] White or slightly green.

[2] A genus very close to *Rhamnus*, distinguished only by its less deep receptacle, incomplete cells and indehiscent fruit, its basilar cupule and apiculate style.

[3] Species about 7. Griseb. *Cat. Pl. Cub.* 32.

[4] *Adansonia*, xi. 273.

[5] "Red."

[6] A genus imperfectly known, but apparently very close to *Rhamnus*, and distinguished chiefly by its elastic dissilient fruit (nearly *Euphorbiaceous*).

[7] Spec. 1. *M. decipiens* H. Bn.

[8] *Nov. Stirp. Fasc.* i. 349, t. 16.—Endl. *Gen.* n. 5723.—B. H. *Gen.* 377, n. 9.

[9] A genus very near *Rhamnidium*, distinguished chiefly by its 2-ovulate cells, a character of very small value, since the cells of *Rhamnus* are sometimes 2-ovulate (Payer, *Organog.* 491).

[10] Spec. about 3. Cav. *Ic.* t. 504 (*Rhamnus*).—H. B. K. *Nov. Gen. et Spec.* vii. 52, t. 618 (*Rhamnus*).—Ad. Br. *Rhamn.* 55 (*Rhamnus*).—A. Gray, *Pl. Wright.* i. 33.

[11] *Fragm.* iii. 62.—B. H. *Gen.* 999, n. 21 *a*

disk. Germen at base of receptacle, 2- or more rarely 3-locular; style short columnar or truncate-conical, apex stigmatose shortly lobed or 2–3-fid; ovules in complete or incomplete cells 1, other characters of *Rhamnus*. Fruit free capsular; exocarp thin, finally separable from endocarp; cocci of endocarp cartilaginous-crustaceous or membranous-woody, septicidally solute and opening inwards, and also at base solute from short receptacle and exposing the shortly stipitate and erect persistent seeds in it. Seed exarillate; testa very hard nitid;[1] albumen fleshy or subcartilaginous; cotyledons of axile embryo flat rather thick.—Trees or shrubs; leaves opposite or alternate penninerved; stipules small or 0; flowers in subumbellate subsimple or compound cymes axillary or inserted in the wood of the branches. (*Australia, New Caledonia.*[2])

6. **Sarcomphalus** P. Br.[3]—Flowers (nearly of *Rhamnus*) hermaphrodite somewhat fleshy; receptacle obconical or sub-hemispherical. Petals long-unguiculate cucullate. Stamens 5, equal in length to opposite petals; filaments much incurved in the bud; anthers hence before anthesis included between the germen and the disk, finally exserted; cells didymous, extrorsely rimose. Germen 2–3-locular, ovules and other characters of *Rhamnus;* branches of style 2, 3, apex obtuse stigmatose. Drupe ovoid, girt at base below the middle with cupule of receptacle; putamen osseous, 2–3-locular; septa thick very hard. Seed suberect obovate compressed, sometimes subcarinate within exarillate; embryo... ?—Glabrous trees or shrubs, unarmed[4] or spinous; leaves alternate petiolate quite entire glabrous coriaceous, penninerved or oftener 3-plinerved; stipules small; flowers in axillary and terminal ramose pedunculate cymes. (*Antilles.*[5])

7. **Hovenia** Thunb.[6]—Flowers hermaphrodite; receptacle depressed and broadly obconical, lined with a thin pilose disk. Sepals

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[1] Red.

[2] Spec. 3, 4. Benth. *Fl. Austral.* i. 414 (*Emmenospermum*).—H. Bn. *Adansonia*, xi. 269.

[3] *Jam.* 179.—Griseb. *Fl. Brit. W.-Ind.* 100.—B. H. *Gen.* 376, n. 7.

[4] And then with the habit and leaves of some *Cinnamoma*.

[5] Spec. 4, 5. L. *Amœn.* v. 395 (*Rhamnus*).—H. B. K. *Nov. Gen. et Spec.* vii. 57, not. (*Rhamnus*).—DC. *Prodr.* ii. 30, n. i. (*Ceanothus*).—Griseb. *Cat. Pl. Cub.* 31. (*Zizyphus havanensis* K. is [Griseb. *loc. cit.*] a species of *Sarcomphali*, notwithstanding its inflorescence, which is rather that of *Zizyphus*).

[6] *Fl. Jap.* 101.—J. *Gen.* 381.—Lamk. *Dict.* iii. 138; *Ill.* t. 131.—DC. *Prodr.* i. 40.—Ad. Br. *Rhamn.* 60, t. 4.—Spach, *Suit. à Buffon*, ii. 456.—Endl. *Gen.* n. 5721.—B. H. *Gen.* 378, n. 12.—Hook. *Fl. Ind.* i. 640.

5, 3-angular, 3-nerved, in the middle carinate within, valvate. Petals 5, unguiculate cucullate, surrounding the stamens the same in number a little longer. Germen conical, adnate at base to receptacle, otherwise free; style thick 3-fid; cells and ovules 3 of *Rhamnus*. Fruit shortly ovoid, at base girt with cupule of receptacle, indehiscent; seeds (of *Rhamnus*) compressed sparsely albuminous.—A moderate-sized tree[1]; leaves alternate petiolate minutely stipulate ovate, unequal at base, 3-nerved, serrate; flowers[2] in axillary and terminal cymes, 2-chotomously ramose; branches of inflorescence under mature fruit much thickened fleshy curved; the pedicels not perceptibly thickened. (*North. India*, *China*, *Japan.*[3])

8. **Noltia** Reichb.[4]—Flowers polygamo-diœcious; receptacle obconico-turbinate, lined with a thin disk, thicker around germen becoming thinner to margin. Perianth and stamens (of *Rhamnus*) inserted beyond the disk. Germen adnate at base to receptacle, otherwise free and tapering to a style 3-lobed at stigmatose dilated apex; cells and ovules 3 (of *Hovenia* or *Rhamnus*). Fruit ellipsoid or shortly obovoid, finally dry, surrounded below the middle with cupule of receptacle; cocci 3, cartilaginous solute, dehiscing longitudinally within. Seeds erect compressed thinly albuminous, furnished at base with a small cupular aril.—A glabrous shrub; branches erect; leaves alternate petiolate oblong obtuse obtusely serrate penninerved; stipules persistent tuberculiform; flowers[5] ramose axillary and terminal cymes. (*South Africa.*[6])

9. **Colubrina** L. C. Rich.[7]—Flowers nearly of *Noltia*; receptacle shortly obconical or hemispherical. The thick disk lining the receptacle annular or 5–10-lobed. Germen within adnate to receptacle (and disk), at free apex attenuated to a 3-fid style; style-branches obtuse at stigmatose apex. Cells and ovules of germen 3

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[1] Habit of *Tilia*.

[2] White, odorous

[3] Spec. 1. *H. dulcis* Thunb —*Bot. Mag.* t. 2360.—Sieb. et Zucc. *Fl. Jap.* t. 73, 74.—*H. acerba* Lindl. *Bot. Reg.* t. 501.—*H. inæqualis* CB. *loc. cit.* n. 2.—*Sicku* Kæmpf. *Amœn.* 808, 809.

[4] *Consp.* 145.—Endl. *Gen.* n. 5725 (*Noltea*).—B. H. *Gen.* 381, n. 21.—*Vittmannia* Wight and Arn. *Prodr.* i. 166 (not Turr. nor Vahl).—*Willemetia* Ad. Br. *Rhamn.* 63, t. 5.—Spach, *Suit. à Buffon*, ii. 462.

[5] White, crowded.

[6] Spec. 1. *N. africana* Reichb.—Wight, *Icon.* t. 490.—Harv. and Sond. *Fl. Cap.* i. 478.—*Ceanothus africanus* L. *Spec.* 284.—Seba, *Thes.* i. t. 22.—DC. *Prodr.* ii. 32, n. 31.—*Vittmannia africana* Wight and Arn.—*Willemetia africana* Ad. Br. *loc. cit.* 64.

[7] Ad. Br. *Rhamn.* 61, t. 4.—Endl. *Gen.* n. 5728.—B. H. *Gen.* 379, n. 17.—Baker, *Fl. Maurit.* 51.—Hook, *Fl. Ind.* i. 642.—*Tubanthera* Commers. MSS.

(of *Rhamnus*). Fruit subglobular (of *Noltia*); cocci finally solute and dehiscing within; seeds[1] compressed sparsely albuminous.—Erect or sarmentose shrubs; leaves alternate (or very rarely opposite) petiolate, penninerved or 3-nerved at base; stipules deciduous; flowers[2] in more or less ramose axillary cymes. (*All trop. regions.*[3])

10? **Cormonema** REISS.[4]—Flowers nearly of *Colubrina*, 5-merous; germen immersed in and free from disk, 3-locular. Fruit and other characters of *Colubrina*; cocci of endocarp finally dehiscing within.—Prickly trees or shrubs; leaves alternate petiolate entire membranous penninerved; limb 2-glandulous at base; stipules small deciduous; flowers[5] axillary cymose.[6] (*Brazil.*[7])

11? **Alphitonia** REISS.[8]—Flowers hermaphrodite or polygamo-diœcious (nearly of *Colubrina*); receptacle obconical and lined with a thick, 5-gonal, often pilose disk. Stamens 5, involved with elongate petals. Germen adnate at base to receptacle (hence also to disk) attenuated in a 2–3-fid style to free apex. Cells and ovules of germen 2, 3 (of *Rhamnus*). Fruit globular, ovoid or ovoid-conical, clothed below the middle with cupule of receptacle; exocarp either thin, dry, or oftener finally suberose-subcarnose and at maturity pulverulent; cocci woody 2, 3, separable, dehiscing longitudinally within and at base free from seminiferous receptacle. Seeds 2, 3, persistent after the fall of the cocci erect, exarillate or clothed from base to middle with a loose obconical aril, pervious at apex; testa hard nitid;[9] embryo albuminous.—Trees or shrubs, either glabrous, or often ferruginous-tomentose; leaves alternate petiolate entire penninerved, oftener hoary beneath; stipules small, deciduous;

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[1] Sometimes persistent on the summit of the receptacle after the fall of the cocci; testa crustaceous nitid.

[2] Yellow or greenish.

[3] Spec. about 12. WIGHT and ARN. *Prodr.* i. 165.—WIGHT, *Ill.* t. 74.—A. GRAY, *Pl. Wright*, i. 33; *Amer. Expl. Exp. Bot.* i. 277.—GRISEB. *Fl. Brit. W.-Ind.* 100.—MIQ. *Fl. Ind.-Bat.* i. p. i. 648.—THW. *Enum. Pl. Zeyl.* 75.—REISS. *Mart. Fl. Bras. Rhamn.* 98, t. 33.—BENTH. *Fl. Austral.* i. 413.—SEEM. *Fl. Vit.* 42.—OLIV. *Fl. Trop. Afr.* i. 383.—WALP. *Ann.* ii. 268; iv. 435.

[4] Ex ENDL. *Gen.* n. 5727.—B. H. *Gen.* 379, n. 16.—*Cæsia* VELLOZ. *Fl. Flum.* 107; iii. t. 23; (nec R. Br.).

[5] Whitish.

[6] A genus closely allied to *Colubrina* (of which perhaps a section ?), distinguished by the glandules of the limb.

[7] Spec. 1, 2. REISS. *Mart. Fl. Bras. Rhamn.* 96, t. 32.

[8] Ex ENDL. *Gen* n. 5729.—B. H. *Gen.* 381, 999, n. 22.

[9] Concerning the structure of the seed, see MIERS, *Contrib.* i. 245, t. 33.

flowers[1] in axillary and terminal very compound ramose many-flowered cymes.[2] (*Trop. and subtrop. Oceania.*[3])

12. **Berchemia** Neck.[4]—Flowers 4, 5-merous, hermaphrodite or polygamous; receptacle concave hemispherical or turbinate, sometimes cupular or subplane, lined with a disk. Germen free (immersed in concavity of disk), 2-locular, attenuated to 2-fid style; branches at stigmatose apex obtuse. Drupe[5] elongate-oblong obtuse, girt at base with short cupule of receptacle; putamen woody or crustaceous, 2-locular.—Unarmed shrubs, erect or climbing; leaves alternate petiolate, minutely stipulate, coriaceous penninerved; nerves parallel close; transverse veins slender; flowers[6] disposed in the divaricate twigs of a wide terminal ramosely-compound spike or of a much branched raceme; solitary or cymulose, sessile or pedicellate.[7] (*Warm regions of Africa and North America*[8])

13. **Sageretia** Ad. Br.[9]—Flowers hermaphrodite (nearly of *Berchemia*); receptacle hemispherical or urceolate. Disk lining tube of receptacle, afterwards free and erect; margin sub-entire or 5-lobed. Germen immersed in concavity of disk free; cells 3; 1-ovulate. Fruit drupaceous; pyrenæ 3, coriaceous, indehiscent; seeds thinly albuminous and other characters of *Scutia.*—Unarmed or spinescent shrubs; leaves sub-opposite penninerved and reticulate veined, entire or serrate; stipules minute, deciduous; flowers[10] on the opposite divaricate branches of a terminal or axillary oftener

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[1] Ferruginous or sometimes white, pendent.

[2] A genus from its germen mostly inferior (within adnate to receptacle) and fruit cupulate to middle, very closely allied to *Colubrina*, from which it can scarcely be generically separated, while there are some species of *Colubrina* (e. g. *C. ferruginosa*) with seeds persistent on torus after the fall of the cocci.

[3] Spec. about 5, of which 1 is tomentose, very various in form: A. Gray, *Amer. Expl. Exp. Bot.* i. 277, t. 22.—Benth. *Fl. Austral.* i. 414.—Seem. *Fl. Vit.* 42.—H. Bn. *Adansonia*, xi. 270.

[4] *Elem.* n. 800.—DC. *Prodr.* ii. 22.—Ad. Br. *Rhamn.* 49, t. 2.—Spach, *Suit. à Buffon*, ii. 446. —Endl. *Gen.* 5719.—B. H. *Gen.* 377, n. 8.—Hook. *Fl. Ind.* i. 637.—*Œnoplea* Hedw. f. *Gen.* i. 151 (ex DC.).

[5] Purple or black.

[6] Greenish or whitish.

[7] A genus hence allied to *Colubrina*, thence to *Zizyphus* (n. 19).

[8] Spec. 8–10. Jacq. *Ic. Rar.* t. 336 (*Rhamnus*). Hook. and Arn. *Beech. Voy. Bot.* t. 37.—Torr. and Gray, *Fl. N.-Amer.* i. 260.—Miq. *Fl. Ind.-Bat.* 1. p. i. 644; Suppl. i. 331.—Thw. *Enum. Pl. Zeyl.* 74.—Benth. *Fl. Hongk.* 67.—A. Gray, *Man.* ed. 5, 114.—Chapm. *Fl. S. Unit. St.* 73.—Oliv. *Fl. Trop. Afr.* i. 381.—Maxim. *Rhamn. Or.-Asiat.* 5.—Walp. *Ann.* i. 966; vii. 588.

[9] *Rhamn.* 52, t. 2.—Spach, *Suit. à Buffon*, ii. 446.—Endl. *Gen.* n. 5720.—A. Gray, *Gen. Ill.* t. 166.—B. H. *Gen.* 379, n. 15.—Hook. *Fl. Ind.* i. 641,

[10] Very small.

large raceme, glomerate or solitary crowded.[1] (*Warm Asia, Indian Archipelago, warm North America, and North-west South America*[2])

14. **Scutia** Commers.[3] — Flowers nearly of *Berchemia*; petals erect unguiculate, flat or cucullate, often 2-lobed. Disk undulate at margin. Stamens nearly equal in length to petals. Germen globular or ovoid free; cells 2–4; style short, 2–4-fid, branches obtuse stigmatose at apex. Fruit dry or slightly fleshy, globular or ovoid, surrounded at base with cupular receptacle; pyrenæ 2–4, angular. Seed compressed; testa various; albumen slight or 0; cotyledons of slightly fleshy embryo plano-convex. Other characters of *Ceanothus*.—Glabrous shrubs, unarmed or oftener spinous; spines straight or curved; branches often angular; leaves opposite, sub-opposite or 2-nate oblong, ovate or obovate, entire or serrulate, coriaceous penninerved, petiolate; stipules small; flowers in axillary scarcely stipitate umbelliform cymes. (*Africa, Asia, and trop. South America.*[4])

15. **Ceanothus** L.[5]—Flowers hermaphrodite (nearly of *Scutia*); receptacle concave, or hemispherical, or shortly and depressedly turbinate; sepals 5, 3-angular, valvate, membranous (often coloured), connivent. Disk thick filling the cavity of the receptacle. Petals and stamens same in number long-stipitate, extending between the sepals. Germen immersed in centre of disk, free or adnate at base, of glandular with 3 slightly prominent angles; style short, 3-fid; branches stigmatose within or to apex. Fruit drupaceous free, subglobosely 3-lobed or depressed at apex; exocarp finally dry; cocci 3, cartilaginous or crustaceous, solute within and dehiscing longitu-

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[1] A genus distinguishable from the preceding only by the nature of its inflorescence.

[2] Spec. about 10. H. B. K. *Nov. Gen. et Spec.* vii. 50, t. 619 (*Rhamnus*).—Torr. and Gray, *Fl. N.-Amer.* i. 263.—Chapm. *Fl. S. Unit. St.* 73.—Wight, *Icon.* t. 19 (*Berchemia*).—Boiss. *Fl. Or.* ii. 22.—Tr. *loc. cit.* 381.—Maxim. *Rham. Or.-Asiat.* 20.

[3] Ad. Br. *Rhamn.* 55, t. 4.—Endl. *Gen.* n. 5724.—B. H. *Gen.* 379, n. 14.—Hook. *Fl. Ind.* i. 640.—Baker *Fl. Maurit.* 51.

[4] Spec, 7, 8. Vahl, *Symb.* iii. t. 58 (*Rhamnus*).—Wight. *Icon.* t. 1071; *Ill.* t. 73.—DC. *Prodr.* ii. 29 (*Ceanothus*, sect. 1).—Harv. and Sond. *Fl. Cap.* i. 477.—Kl. *Pet. Reis. Mossamb. Bot.* 110, t. 21.—Tul. *Ann. Sc. Nat.* sér. 4, viii. 116.—Chapm, *Fl. S. Unit. St.* 72.—Reiss. *Mart. Fl. Bras. Rhamn.* 92, t. 24, 30.—Walp. *Ann.* i. 193; vii. 592.

[5] *Gen.* n. 267.—J. *Gen.* 380 (part.).—Gærtn. *Fruct.* t. 106, fig. sup. — Lamk. *Dict.* i. 659 (part.); Suppl. ii. 140; *Ill.* t. 129.—DC. *Prodr.* ii. 29 (part.).—Ad. Br. *Rhamn.* 62, t. 4.—Spach, *Suit. à Buffon*, ii. 457.—Endl. *Gen.* n. 5726.—A. Gray, *Gen. Ill.* t. 169.—B. H. *Gen.* 378, n. 13.—H. Bn. *Payer Fam. Nat.* 328.—*Forrestia* Rafin. *N.-York Med. Repos.* ii. hex. v. 350 (ex Endl.).

dinally. Seeds smooth; testa crustaceous, arillate to hilum; cotyledons of albuminous embryo elliptical or obovate.—Small trees or shrubs, sometimes spinescent; leaves opposite or generally alternate, entire or dentate, penninerved or 3-plinerved at base, glabrous or somewhat scaly or canescent tomentose beneath, petiolate; stipules small, caducous; flowers[1] in corymbs or racemes terminal and axillary to uppermost leaves of twigs, densely ramose, cymiferous or glomeruliferous, umbelliform or elongate thyrsoid. (*Temp. and trop. west. regions of both Americas.*[2])

16. **Ventilago** Gærtn.[3]—Flowers hermaphrodite or more rarely polygamous; receptacle shortly obconical or broadly cupular, lined with a thick annular or obtusely 5-gonal disk flat or depressed above. Sepals 5, valvate, carinate within. Petals same in number deflexed cucullate, entire or 2-lobed at apex. Stamens equal in number; filaments free or adnate to petals at base; anthers introrse or laterally rimose; connective sometimes excurrent. Germen immersed in centre of disk, 2-locular; style very short compressed, stigmatose at apex, shortly or very shortly 2-lobed, afterwards accrescent. Fruit dry, indehiscent, subglobular, girt at the base or to a greater or less height with the cupular receptacle apiculate to style accrescent and dilated on both sides to an erect linear membranous or coriaceous veined wing. Seed 1, exalbuminous; cotyledons of fleshy embryo thick; radicle inferior short.—Scandent or sometimes subprostrate shrubs, glabrous or pubescent; leaves alternate ovate or oblong, oftener oblique at base, petiolate; stipules minute, caducous; flowers in terminal or axillary more or less compound ramose cymiferous racemes, bracteolate. (*Warm Asia, Africa and Oceania.*[4])

17. **Smythea** Seem.[5]—Flowers of *Ventilago*. Fruit[6] ovate much

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[1] White, yellow or azure; pedicels and calyx often coloured.

[2] Spec. 20–25. H. B. K. *Nov. Gen. ct Spec.* vii. t. 615.—Hook. *Fl. Bor.-Amer.* t. 45.—Torr and Gray, *Fl. N.-Amer.* i. 264.—A. Gray, *Man.* ed. 5, 115.—Chapm. *Fl. S. Unit. St.* 74.—*Bot. Mag.* t. 4660, 4664, 4806, 4810, 4815, 5127, 5165, 5177.—Walp. *Ann.* ii. 267; iv. 434; vii. 591.

[3] *Fruct.* i. 233, t. 49.—Poir. Dict. viii. 451.—DC. *Prodr.* ii. 38.—Ad. Br. *Rhamn.* 50, t. 1.—Endl. *Gen.* n. 5715.—B. H. *Gen.* 375, n. 1.—Hook. *Fl. Ind.* i. 630.

[4] Rumph. *Herb. Amboin.* v. t. 12.—(*Funis viminalis*).—Roxb. *Pl. Corom.* i. 35, t. 76; *Fl. Ind.* ii. 413.—Bl. *Bijdr.* 1144.—Wight and Arn. *Prodr.* i. 164.—Wight, *Icon.* t. 163.—Benth. *Fl. Austral.* i. 411; *Journ. Linn. Soc.* v. 77.—Seem. *Fl. Vit.* 41.—A. Gray, *Amer. Expl. Exp. Bot.* i. 274.—Tul. *Ann. Sc. Nat.* sér. 4, viii. 120.—Oliv. *Fl. Trop. Afr.* i. 378.—H. Bn. *Adansonia*, xi. 268.—Walp. *Ann.* vii. 586.

[5] *Bonplandia* (1861), 255; *Fl. Vit.* 41, t. 11.—B. H. *Gen.* 375, 998, n. 2.—Hook. *Fl. Ind.* i. 632.

[6] Rather large, downy.

compressed, thickly crustaceous or woody, the capsule dehiscing vertically along the middle of both faces, 2-valvate. Seeds 1, compresssed; albumen exalbuminous. — Subscandent shrubs; habit, leaves and other characters of *Ventilago*; flowers in axillary or terminal ramose cymes. (*Viti Island*, *New Caledonia*, *Borneo.*[1])

18. **Paliurus** T.[2]—Flowers nearly of *Ventilago*; receptacle broadly cupular or depressed obconical, lined with a thick depressed, 5-lobed disk, flat above. Sepals 5, 3-angular acute, carinate within. Petals 5, cucullate, oftener deflexed, and stamens of *Ventilago*. Germen semi-immersed in disk and almost entirely free, 3-locular; branches of short style 3 oblong. Fruit girt at base with short cupular receptacle, obconical and dilated above to a large orbicular transverse membranaceo-coriaceous venose entire or lobate wing, indehiscent; endocarp thin dry; putamen woody, 1–3-locular. Seed in cells 1, obovate compressed smooth; testa crustaceous; cotyledons of scantily albuminous embryo orbicular or elliptical; radicle short inferior.—Decumbent or erect shrubs, glabrous or slightly tomentose, armed with strong straight or curved stipular spines; leaves alternate petiolate; limb ovate or cordate crenulate, 3-nerved; flowers[3] in short axillary fasciculate cymes. (*South. Europe*, *the East*, *north. China.*[4])

19. **Zizyphus** T.[5]—Flowers nearly of *Paliurus*, rarely apetalous; disk plane depressed, obtusely 5-gonal. Anthers introrse or laterally subextrorse. Germen 2–4-locular; style-branches from base or higher 2–4-fid divergent, stigmatose at attenuate apex. Drupe globular or ovoid, furnished at base with short cupule of receptacle (rarely deciduous, sometimes concave); cells of osseous or woody

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[1] Spec. 2, 3.

[2] *Inst.* 616, t. 387.—Adans. *Fam. des Pl.* ii. 304.—J. *Gen.* 380.—Gærtn. *Fruct.* i. 203, t. 43. —Lamk. *Ill.* t. 210.—Sav. *Lamk. Dict.* iv. 697; Suppl. iv. 262.—DC. *Prodr.* ii. 22.—Ad. Br. *Rhamn.* 46, t. 1.—Spach, *Suit. à Buffon*, ii. 439. —Endl. *Gen.* n. 5716.—B. H. *Gen.* 375, n. 3. —*Aspidocarpus* Neck. *Elem.* n. 802. —*Aubletia* Lour. *Fl. Cochinch.* (ed. 1790), 283 (not Gærtn. nor Jacq. nor Rich. nor Schreb.).

[3] Small, yellow.

[4] Spec. 2, of which 1 is Chinese, L. *Spec.* 281 (*Rhamnus*).—W. *Spec.* i. 1103 (*Zizyphus*).—Don, *Bot. Mag.* t. 2535.—Benth. *Fl. Hong Kong*, 66. —Boiss. *Fl. or.* ii. 11.—Gren. et. Godr. *Fl. de Fr.* i. 335.—Walp. *Ann.* vii. 586.

[5] *Inst.* 627, t. 403.—J. *Gen.* 380.—Gærtn. *Fruct* i. 202, t. 43.—Lamk. *Dict.* iii. 316; Suppl. iii. 191; *Ill.* t. 185.—DC. *Prodr.* ii. 19. —Ad. Br. *Rhamn.* 47, t. 1.—Spach, *Suit. à Buffon*, ii. 441.—Endl. *Gen.* n. 5717.—Payer, *Organog.* 490, t. 97.—A. Gray, *Gen. Ill.* t. 163. B. H. *Gen.* 375, 998, n. 4.—H. Bn. *Payer Fam. Nat.* 328.—Hook. *Fl. Ind.* i. 632.—Baker, *Fl. Maurit.* 51.

putamen 1–3, 1–2-spermous. Seeds plano-convex smooth; albumen thin (or 0), more rarely rather thick; cotyledons of erect somewhat thick embryo rather fleshy.—Trees or shrubs, erect, sarmentose or decumbent, often uncinate-aculeate; leaves alternate, entire or crenate, coriaceous or membranous, glabrous or tomentose, at base oftener 3–5-nerved; stipules 2; both spinescent straight or hooked; or one caducous; flowers[1] in axillary short or subumbellate cymes.[2] (*All warm regions.*[3])

20. **Condalia** Cav.[4]—Flowers oftener hermaphrodite; receptacle broadly obconical, lined with thick fleshy flat 5-gonal disk; calyx 5-phyllous, valvate, and other characters of *Zizyphus.* Petals 5, small (*Microrhamnus*) or oftener 0. Germen immersed in concavity of disk free; style short thick, at apex stigmatose 2–3-lobed; cell of germen 1; ovules in cell 2 subbasilar ascending; micropyle introrsely inferior; spurious septum more or less incomplete ventral somewhat projecting between the two ovules. Fruit drupaceous or finally siccate, girt at base with cupule of receptacle; putamen thick osseous or woody, 1- or spuriously 2-locular; testa of seeds thin; cotyledons of sparsely albuminous, sometimes subruminate, embryo flat.—Rigid ramose glabrous shrubs; branches spinescent; leaves[5] alternate or fasciculate subsessile entire coriaceous penninerved, deciduous; stipules minute, deciduous; flowers[6] in axillary cymes, few or solitary. (*Trop. and temp. regions of both Americas.*[7])

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[1] Small, greenish.

[2] A genus distinguished from *Paliurus* only by its fruit.

[3] Spec. 40–50. L. *Spec.* 282 (*Rhamnus*).—Pall. *Fl. Ross.* ii. t. 59 (*Rhamnus*).—Desf. *Act. Acad. Par.* (1788), t. 21; *Fl. Atl.* i. 200.—Cav. *Icon.* t. 105.—Vahl, *Ecl.* iii. t. 23 (*Paliurus*).—Wight, *Icon.* t. 99, 282, 339.—Bl. *Bijdr.* 1141.—Guillem. et Perr. *Fl. Sen. Tent.* i. 144, t. 37.—Oliv. *Fl. Trop. Afr.* i. 379.—Harv. and Sond. *Fl. Cap.* i. 475.—Miq. *Fl. Ind. Bat.* i. p. 1, 641; *Ann. Mus. Lugd.-Bat.* iii. 30.—Maxim. *Rhamn. As. Or.* 3.—Thw. *Enum. Pl. Zeyl.* 73.—Benth. *Fl. Austral.* i. 411.—Boiss. *Fl. Or.* ii. 12.—Sibth. and Sm. *Fl. Græc.* t. 241.—Reiss. *Mart. Fl. Bras. Rhamn.* 86, t. 27.—Tr. *Ann. Sc. Nat.* ser. 5, xvi. 380.—Gren. et Godr. *Fl. de Fr.* i. 334.—Walp. *Ann.* i. 192; ii. 266; vii. 587.

[4] *Ann. Scienc. Nat.* i. 39, t. 4; *Icon.* vi. 16, t. 525.—DC. *Prodr.* ii. 28.—Ad. Br. *Rhamn.* 48, t. 1.—Endl. *Gen.* n. 5717.—H. Bn. *Adansonia*, ii. 257; *Payer Fam. Nat.* 331.—A. Gray, *Gen. Ill.* t. 164.—B. H. *Gen.* 376, n. 5.—*Reynosia* Griseb. *Cat. Pl. Cub.* 33.—*Microrhamnus* A. Gray, *Pl. Wright.* i. 33 (not Maxim.).—B. H. *Gen.* 376, n. 6.

[5] Often small, sometimes parallel lineate beneath.

[6] Small, greenish, or whitish.

[7] Spec. 8–10. Hook. *Icon.* t. 287.—Torr and Gray, *Fl. N.-Amer.* i. 685.—C. Gay, *Fl. Chil.* ii. 20.—Griseb. *Fl. Brit. W.-Ind.* 100.—A. Gray, *Amer. Expl. Exp. Bot.* i. 275.—Reiss. *Mart. Fl. Bras. Rhamn.* 89, t. 24, 28.—Walp. *Ann.* iv. 432 (*Microrhamnus*), 433; vii. 587 (*Sciadophila* Phil. is a species of *Condalia*, Miers, *Contrib.* i. 304).

II. GOUANIÆ.

21. **Gouania** L.—Flowers hermaphrodite or polygamous; receptacle concave obconical or urceolate. Sepals 5, inserted at mouth of receptacle, valvate. Petals same in number alternate cucullate. Stamens 5, oppositipetalous, inserted with perianth and superior. Disk epigynous interior to perianth and stamens, 5-gonal or 5-lobed; lobes sometimes very prominent produced to horns or layers more or less connate internally at the base with the sepals. Germen inferior and adnate to concavity of receptacle, 3-locular; style central divided more or less deeply into 3 branches stigmatose at apex. Ovule in cells 1, suberect (of *Rhamnus*). Fruit inferior coriaceous, crowned with sepals and disk, vertically 3-alate; wings wide rotund; cocci of endocarp 3, woody or submembranous, finally separate from 6-partite columella and indehiscent, externally alate at margin. Seeds obovate compressed or plano-convex; testa hard nitid; cotyledons of sparsely albuminous embryo somewhat flat; radicle short inferior.—Shrubs oftener scandent cirrhiferous, glabrous or tomentose; leaves alternate, entire or dentate, penninerved or 3-plinerved at base, petiolate; stipules oblong, sometimes large, deciduous; flowers in spikes or terminal and axillary glomeruliferous racemes; rachis often changed into a cirrhus. (*All trop. regions.*) See p. 59.

22. **Reissekia** Endl.[1]—Flowers of *Gouania;* germen inferior, 3–4-locular. Fruit inferior, 3–4-gonal coriaceous; lobes compressed membranously alate; 3–4-coccous within; wings finally 2-partite and spongily reticulate; cocci crustaceous, separate from 6–8-partible columella. Seeds and all other characters of *Gouania.*—A scandent much-branched cirrhiferous shrub; branches slender angular; leaves alternate cordate serrulate, sub-3-nerved at base, petiolate; stipules minute; flowers[2] in axillary compound umbelliform cymes; pedicels long.[3] (*Brazil.*[4])

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[1] *Gen.* n. 5747.—B. H. *Gen.* 386, n. 37.

[2] Small, golden.

[3] A genus very near to *Gouania*, differing in its fruit and also its inflorescence, which is quite that of *Helinus* (differing in its apterous fruit).

[4] *Spec.* 1. *R. smilacina.*—*R. cordifolia* Steud. —Reiss. *Mart. Fl. Bras. Rhamn.* 112, t. 26, 40. —*Gouania smilacina* Sm. *Rees Cyclop.* xvi. n. 8. —*G. cordifolia* Radd. *Mem. Soc. della Scienz. Moden.* xviii. 39 (1820).—*Celastrus umbellatus* Velloz. *Fl. Flum.* 98; ii. t. 137.

23. **Crumenaria** Mart.[1]—Flowers polygamous (nearly of *Gouania*); receptacle campanulate beyond adnate germen. Sepals valvate. Petals cucullate, inserted at the base of the hollows of calyx. Stamens enclosed by petals. Germen quite inferior, 2–3-locular; branches slender cylindrical erect (2–3-fid); style dilated at stigmatose apex. Fruit inferior and crowned with remains or prominent cicatrice of perianth, produced in 2, 3 vertical winged lobes; wings membranous veined (marginal as regards cocci), 2-lamellate; cocci chartaceous obcordate, finally separate from 3-partite columella and dehiscing within. Seed obovate; testa rather hard; cotyledons of thinly albuminous embryo suborbicular plano-convex fleshy; radicle inferior very short.—Herbs or annuals;[2] root fibrous; leaves alternate petiolate cordato-ovate membranous, 3-nerved at base; or oftener perennial; rhizome woody; annual branches thin reedy, terete or compressed; leaves 0 or very small scaly; stipules very small linear ciliate; flowers[3] in axillary slightly ramose, more rarely racemose cymes, sometimes few or solitary. (*Trop. Brazil.*[4])

24. **Helinus** E. Mey.[5]—Flowers of *Gouania;* disk epigynous rather flat. Fruit inferior, shortly obovoid exalate, areolate at depressed apex, finally dry coriaceous; cocci 3, crustaceous, finally separate from central 3-partite columella and dehiscing within; seeds and other characters of *Gouania* (or *Reissekia*).—Scandent shrubs, glabrous cirrhiferous or pubescent; leaves alternate cordato-ovate entire, slenderly petiolate; stipules small, deciduous; inflorescence of *Reissekia*. (*East Indies*, *South Africa*, *Abyssinia*.[6])

25. **Phylica** L.[7]—Flowers hermaphrodite or more rarely polygamous; receptacle very concave, tubular or obconical or urceolate,

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[1] *Nov. Gen. et Spec.* ii. 68, t. 160.—Ad. Br. *Rhamn.* 73.—Endl. *Gen.* n. 5748.—B. H. *Gen.* 385, n. 34.—H. Bn. *Adansonia*, xi. 290.

[2] In 1 spec. viz. *C. decumbens* Mart.—G. Don, *Gen. Syst.* ii. 44.

[3] Small, white.

[4] Spec. 3, 4 (1 of which is membranous-leaved; root annual, in habit very different from the rest, but in no generic sense distinct). Reiss. *Mart. Fl. Bras. Rhamn*, 112, t. 41.

[5] *In Herb. Drège* (ex Endl. *Gen.* n. 5745).—B. H. *Gen.* 385, n. 36.—Hook. *Fl. Ind.* i. 644.

[6] Spec. 3. Ait. *Hort. Kew.* i. 266 (*Rhamnus*).—A. Rich. *Tent. Fl. Abyss.* i. 139, t. 31.—Harv. and Sond. *Fl. Cap.* i. 479.—Jaub. and Spach, *Ill. Pl. Or.* v. t. 472.—Walp. *Ann.* vii. 608.

[7] *Gen.* n. 266.—J. *Gen.* 381.—Gærtn. *Fruct.* i. 114, t. 24.—Lamk. *Ill.* t. 127.—Poir. *Dict.* v. 286; Suppl. iii. 400.—DC. *Prodr.* ii. 34.—Ad. Br. *Rhamn.* 68, t. 6, ii.—Spach, *Suit. à Buffon*, ii. 467.—Endl. *Gen.* n. 5738.—B. H. *Gen.* 380, n. 18.—H. Bn. *Payer Fam. Nat.* 329.—Baker *Fl. Maurit.* 53.

sometimes cylindrical or hypocrateriform (*Calophylica*[1]). Sepals 5, superior, inserted at mouth of receptacle, villose without or on both sides or densely barbate. Petals 0, or setaceous (*Trichocephalus*[2]), oftener concave or cucullate, either glabrous (*Soulangia*,[3] *Tylanthus*[4]), or ciliato-barbate (*Petalopogon*.[5]) Stamens 5, opposite to and enclosed by petals; filaments generally short incurved; anthers short, sometimes 3-dymous; clefts of cells 2, finally introrse, either distinct or oftener confluent at apex into one hippocrepiform. Disk epigynous, produced to greater or less height within the tube of the calyx, sometimes small or inconspicuous. Germen inferior; style short or elongate, at stigmatose apex 3-fid or 3-lobed, persistent or caducous; ovules in cells 3 solitary (of *Rhamnus*). Fruit[6] inferior, subplane at apex or slightly depressed, generally prominent and areolate, glabrous or tomentose; exocarp more or less thick; cocci of endocarp 3, finally separate and dehiscing within. Seeds compressed-obovoid; testa coriaceous nitid; embryo scantily albuminous.—Small shrubs, rarely arborescent; indumentum various, often tomentose-incanescent; leaves alternate or rarely opposite, generally ericoid crowded, rarely expanded coriaceous-membranous veined; margin oftener recurved; stipules generally 0[7]; flowers axillary to leaves or oftener sessile or shortly pedicellate in axils of bracts or uppermost leaves of twigs, hence spicate or capitate terminal, more rarely cymose. (*South extra-trop., insular and east trop. Africa*.[8])

26. **Nesiota** HOOK. F.[9]—Flowers (nearly of *Phylica*) 4–5-merous; receptacle obconical. Germen quite inferior, 3–4-locular, crowned with pubescent disk. Fruit ovoid, exserted at apex beyond urceolate receptacle and there free, otherwise adnate with it; exocarp subfleshy; cocci finally separate and other characters of *Phylica*.—Small branched trees;[10] leaves opposite petiolate, elliptico-oblong

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[1] PRESL, *Bot. Bem.* 39.

[2] AD. BR. *Rhamn.* 67, t. 6, 1.—*Walpersia* REISS. ex ENDL. *Gen.* n. 5736.

[3] AD. BR. *Rhamn.* 70, t. 6, iii.—ENDL. *Gen.* n. 5740.

[4] REISS. ex. ENDL. *Gen.* n. 5739.

[5] REISS. *Nov. Stirp. Vindob. Dec.* 82.—ENDL. *Gen.* n. 5737.

[6] Oftener dark.

[7] In 1 spec. (*P. stipularis* L.) developed.

[8] Spec. about 60. L. *Spec.* 283; *Mantiss*, 208. —L. F. *Suppl.* 153.—THUNB. *Prodr.* 45; *Fl. Cap.* 203.—BERG. *Pl. Cap.* 52.—W. *Spec.* 1112.—WENDL. *Collect.* i. 7.—VENT. *Malmais*, t. 57.—RŒM. et SCH. *Syst.* v. 490.—BERNH. *Krauss Beyt.* 44.—HARV. and SOND. *Fl. Cap.* i. 479.—TUL. in *Ann. Sc. Nat.* sér. 4, viii. 128 (*Tylanthus*).—LODD. *Bot. Cab.* t. 36, 695.—*Bot. Reg.* t. 711, 1498.—*Bot. Mag.* t. 224, 2704.—WALP. *Ann.* i. 194; vii. 592.

[9] *Gen.* 380, n. 19.

[10] With habit of some *Avicenniæ*, or *Rubiaceæ* and some *Garryæ*.

(wide) entire coriaceous penninerved reticulate-veined canescent-tomentose; stipules interpetiolate large, deciduous; flowers axillary in loose pedunculate cymes, bracteate or bracteolate.[1] (*St. Helena.*[2])

27. **Lasiodiscus** Hook. F.[3]—Flowers hermaphrodite; receptacle cupuliform or broad obconical. Sepals 5, wide, 3-angular, valvate, finally reflexed. Petals small concave, rather shorter, deciduous. Stamens inserted with perianth around thick epigynous glabrous or densely velutinous disk crowning the germen; filaments subcomplanate longer than the petals; anthers small introrsely 2-rimose. Germen inferior, filling the cavity of the receptacle; cells 3, 1-ovulate; ovules of *Rhamnus*; style erect rather thick, sometimes articulated a little above the base, at apex 3-fid; branches recurved, stigmatose within and at obtuse apex. Fruit finally dry obconico-turbinate, entirely adnate to receptacle except at depressed convex apex, 3-coccous (?); seed unequally obovoid depressed; cotyledons of albuminous embryo suborbiculate (virescent).—Shrubs, sometimes subscandent, glabrous; innovations strigillose; leaves opposite large, shortly petiolate entire or serrulate membranaceous; stipules interpetiolar erect lanceolate, free or connate at base, deciduous; flowers (rather large) in terminal axillary compound subumbellate pedunculate cymes; branches and twigs of inflorescence compressed or ferrugineo-tomentose; fructiferous curved. (*Trop. Western Africa, Malacca.*[4])

28 ? **Trymalium** Fenzl.[5]—Flowers polygamous; receptacle obconical. Sepals 5,[6] 3-angular, deciduous or patent. Petals 5, cucullate, enclosing small anthers. Stamens 5; filaments incurved, inserted with perianth around epigynous annular or 5-lobed or partite disk; anthers ovoid. Germen inferior, internally adnate to receptacle, free only at apex and attenuate to 2, 3-lobed style; cells 1, 2, 1-ovulate. Fruit capsular, quite adnate within to thin receptacle,

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[1] A genus scarcely to be retained, though in some cases in the form of its apical fruit, in other cases, in its ample leaves and loose cymes, distinct from most *Phylicas*, it would perhaps be better regarded as a section of the latter in which the above characters are occasionally observed.

[2] Spec. 1. *N. elliptica* Hook. f.—*Phylica elliptica* Roxb. *Beats. App.* 316.—DC. *Prodr.* ii. 34. n. 1.

[3] *Gen.* 381, n. 20.

[4] Spec. 2. Oliv. *Fl. Trop. Afr.* i. 385.—H. Bn. *Adansonia*, viii. 209. Epigynous disk in Western species densely velutino-lanate, in that of Madagascar rather glabrous.

[5] *Heug. Enum.* 20.—Endl. *Gen.* n. 5744.—B. H. *Gen.* 382, n. 34.

[6] Often coloured.

or slightly prominent at vertex, 2–3-valvate at apex; cocci finally dehiscent or indehiscent. Seeds ovoid or compressed, attached to a dilated or cupular-arillate funicle; embryo albuminous.—Shrubs oftener stellate-canescent or ferruginous; leaves alternate membranous, revolute at margin; flowers[1] in very compound ramose cymiferous racemes.[2] (*South west. Australia.*[3])

29. **Pomaderris** Labill.[4]—Flowers nearly of *Trymalium*; petals 5, concave, flat (or 0). Stamens 5; filaments inflexed or plicate at apex; anthers oblong, not enclosed by petals. Disk epigynous thin covering the top of the germen exserted from the receptacle to the base of the calyx, sometimes pilose. Capsule at apex projecting from adnate conical tube of receptacle and free, there dehiscing longitudinally or transversely by an operculum; endocarp 3-coccous; seeds and other characters of *Trymalium.*—Shrubs, for the most part adpressedly stellato-canescent or rufescent, sometimes hirsute; leaves alternate flat, revolute at margin; stipules small, often fuscate, caducous; flowers[5] in very ramose compound-cymiferous umbelliform or corymbiform racemes; cymes sometimes axillary solitary. (*South-west. Australia, New Zealand.*[6])

30. **Spyridium** Fenzl.[7]—Flowers nearly of *Pomaderris*; petals enclosing small anthers. Germen free at apex or wholly adnate within to receptacle. Disk covering either the top of the ovary and base of receptacular tube or the apex of the latter when higher than the germen (*Stenodiscus*[8]); cells 3, 1-ovulate; capsule inferior crowned with persistent sepals and 3-valved at apex; seeds and other characters of *Pomaderris.*—Shrubs; leaves oftener small, flat or revolute at margin; stipules (fuscous) persistent; indumentum of *Pomaderris*; flowers capitate; capitules in cymes or capituliform

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[1] Generally white.

[2] A genus scarcely distinguished from the following.

[3] Spec. 5. Labill. *Pl. Nouv.-Holl.* i. 60, t. 84 (*Ceanothus*).—Fenzl, *Hueg. Enum.* 21, n. 5, 6.—Benth. *Fl. Austral.* i. 423.—Walp. *Ann.* ii. 270, n. 2, 3, 6–12; vii. 595.

[4] *Pl. Nouv.-Holl.* 1, 61 (part.), t. 86, 87.—DC. *Prodr.* ii. 33.—Ad. Br. *Rhamn.* 64, t. 5.—Spach, *Suit. à Buffon*, ii. 467.—Endl. *Gen.* n. 5743.—B. H. *Gen.* 381, 999, n. 23.—H. Bn. *Payer Fam. Nat.* 229.

[5] Golden or greenish.

[6] Spec. 18. Fenzl, *Hueg. Enum.* 21 (part.)—Hook. *Journ. Bot.* i. 256.—A. Cunn. *Field N.S.-Wales*, 351.—F. Muell. *Fragm.* ii. 131; iii. 68, 166, 168.—Reiss. *Linnæa*, xxix. 266.—A. Gray, *Amer. Expl. Exp. Bot.* i. 282.—Hook. f. *Fl. N.-Zel.* i. 46; *Man. N.-Zeal.* 43; *Fl. Tasm.* i. 76.—Benth. *Fl. Austral.* i. 415.—Lodd. *Bot. Cab.* t. 120.—*Bot. Mag.* t. 1823, 3219, 3212.—Walp. *Ann.* vii. 594.

[7] *Hueg. Enum.* 24.—Endl. *Gen.* n. 5741.—B. B. *Gen.* 382, 999, n. 25.

[8] Reiss. *Linnæa*, xxix. 295.

compound glomerules scarcely exceeding the leaves; floral leaves (generally different from the cauline) 1, 2, or ∞, surrounding and sub-enveloping the exterior capitules of the inflorescence.[1] (*Extra trop. Australia.*[2])

31. **Cryptandra** Sm.[3]—Flowers nearly of *Spyridium*; receptacle, covering the germen below, hypocrateriform or campanulate, and beyond produced to a tube, sometimes tubular (*Wichurea*[4]); disk annular thin or 0, sometimes clothing the tube and more conspicuous (*Wichurea*); genital organs, fruit, seeds and other characters of *Spyridium* (or *Pomaderris*).—Small ramose shrubs, oftener spinescent or ericoid; leaves small, ovate or revolute at margin and hence narrow, generally canescent beneath; stipules (fuscate) persistent; flowers capitate, intermixed with leaves or collected at the ends of twigs or separated, sometimes pedicellate, surrounded figure-like with imbricate bracts.[5] (*Extra trop. Australia.*[6])

32? **Stenanthemum** Reiss.[7]—Flowers of *Cryptandra*; receptacle clothing adnate germen within and beyond produced to a thin often constricted tube. Disk epigynous, lining the top of the receptacle, thin or sometimes 0. Perianth and other parts of flower, inferior fruit and seeds of *Pomaderris* (or *Cryptandra*).—Shrubs; habit, leaves small flat or revolute at margin, and stipules of *Spyridium*; capitules dense crowded in capituliform glomerules; inflorescence and floral leaves of *Spyridium*.[8] (*Extra trop. Australia?*[9])

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[1] A genus scarcely to be retained.

[2] Spec. about 25. Labill. *Pl. Nouv.-Holl*, 1. t. 85 (*Ceanothus*).—Hook. f. *Fl. Tasm.* i. 72 (*Cryptandra*).—Reiss. *Linnæa*, xxix, 270 (*Trymalium*), 288.—F. Muell. *Fragm.* iii. 78.—Benth. *Fl. Austral.* i. 425.—Walp. *Ann.* vii. 598.

[3] *Trans. Linn. Soc.* iv. 217.—DC. *Prodr.* ii. 38.—Ad. Br. *Rhamn.* 65, t. 3.—Spach, *Suit. à Buffon*, ii. 465.—Endl. *Gen.* n. 5742.—B. H. *Gen.* 383, 999, n. 27.

[4] Nees, *Pl. Preiss.* ii. 290.

[5] Oftener dark.

[6] Spec. about 20. Rudg. *Trans. Linn. Soc.* x. t. 18.—Fenzl, *Hueg. Enum.* 23 (part.).—Reiss. *Pl. Preiss.* ii. 283; *Linnæa*, xxix. 291.—Hook. f. *Fl. Tasm.* i. 74, t. 12.—Schltl, *Linnæa*, xx. 639.—Lindl. *Mitch. Exp.* ii. 178.—Turcz. *Bull. Mosc.* (1858), i. 459.—F. Muell. *Fragm* iii. 64.—Benth. *Fl. Austral.* i, 437.—Walp. *Ann.* ii. 268 (sect. 1, 3); vii. 601.

[7] *Linnæa*, xxix. 295.—B. H. *Gen.* 382, 999, n. 26.

[8] A genus scarcely to be retained, flowers nearly of *Cryptandra*, between which and *Spyridium* they form a mean, but generally more slender.

[9] Spec. 6. Reiss. *Pl. Preiss.* ii. 288) *Cryptandra*).—Hook. f. *Fl. Tasm.* i. 75, t. 12 B. (*Cryptandra* sect. *Stenocodon*).—Schltl, *Linnæa*, xx. 640 (*Cryptandra*). — Turcz. *Bull. Mosc.* (1858), i. 458.—F. Muell. *Fragm.* iii. 83 (*Spyridium*).—Benth. *Fl. Austral.* i. 435.—Walp. *Ann.* vii. 600.

III. COLLETIEÆ.

33. **Colletia** Commers.—Flowers hermaphrodite or polygamous; calyx membranous (coloured) cylindrical or urceolate-tubular, enlarged at base and there circumscissus; laciniæ of limb 4, 5, valvate, finally reflexed. Petals 5 (or 0), small cucullate. Stamens same in number opposite petals and with them inserted in the hollows, subequal in length; filaments free; anthers short, 2-locular; clefts 2, often finally confluent above into one of horseshoe shape. Disk glandular lining cupule at bottom of flower, sometimes thin or invisible, oftener thick and involute at free margin. Germen for most part free, adnate to base of cupule, 3-locular; style erect elongate, capitate at hollow apex; lobes stigmatose 3 or 6 (3 alternate scarcely perceptible). Ovule in cells[1] (of *Rhamnus*); micropyle introrsely inferior, finally lateral. Fruit drupaceous, girt at base with cupule of receptacle; exocarp finally dry coriaceous; endocarp 2, 3-coccous; cocci crustaceous, 2-valvate. Seeds plano-convex; testa coriaceous; albumen fleshy; cotyledons of erect embryo compressed; radicle short inferior.—Shrubs generally leafless; branches decussate spinescent, sometimes thick compressed very rigid; leaves opposite very small, squamiform (or 0); flowers below spines solitary or cymose few; pedicels short and slender wavering. (*Warm and temp. South America.*) See p. 62.

34? **Discaria** Hook.[1]—Flowers (nearly of *Colletia*) 4–5-merous, sometimes apetalous (*Notophæna*[2]); tube of calyx terete or campanulate, more or less produced beyond disk. Petals equal in number to lobes of calyx (or sometimes 0) inserted in hollows of orifice of calyx-tube cucullate small. Stamens of *Colletia*, inserted with and opposite to petals; anthers 2-rimose (*Ochetophila*[3]) or from apical confluence of cells horseshoe-like rimose (*Eudiscaria*). Disk lining bottom of tube, annular, entire or lobed at margin free. Germen generally subglobular, sub-3-lobed, at base adnate to or immersed in concavity of receptacle; cells 3; ovule[4] and other characters of *Colletia*. Fruit drupaceous, finally coriaceous, dry capsular, surrounded at base to greater or less height with the persistent receptacular cupule and disk; cocci 3, crustaceous, finally 2-valvate. Testa of suberect plano-convex seed coriaceous; micropyle in general finally lateral; albumen fleshy; cotyledons of slightly fleshy embryo orbicular or shortly ovate; radicle very short inferior.—Ramose shrubs, foliate or more rarely leafless; twigs decussate, often spinescent, articulate or subarticulate at nodes; leaves (small or minute) coriaceous rather thick, imperceptibly penninerved, oftener obovate, sometimes serrate; flowers axillary solitary or oftener few cymose; pedicels waving; other characters of *Colletia*.[1] (*Trop. alpine and extra-trop. America*, *Australia*, *New Zealand*.[2])

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[1] *Bot. Misc.* i. 156, t. 44, 45.—Endl. *Gen.* n. 5731.—Miers, *Ann. Nat. Hist.* ser. 3, v. 370; *Contrib.* i. 273, t. 38.—B. H. *Gen.* 383, n. 29.—*Tetrapasma* Don, *Gen. Syst.* ii. 40.

[2] Miers, *Contrib.* i. 266, t. 37.

[3] Pœpp. Endl. *Gen.* n. 5733.—Miers, *Ann. Nat. Hist. loc. cit.* 376; *Contrib.* i. 279, t. 39.

[4] Double integument.

35 ? **Adolphia** Meissn.[3]—Flowers nearly of *Colletia*; receptacle much shorter subcampanulate, lined with a disk as far as the insertion of petals and stamens. Petals 5, inserted between the 3-angular-ovate and recurved lobes of the calyx, small, cucullate, at base rather longer attenuated subspathulate. Stamens 5, oppositipetalous and inserted at margin of disk, nearly equal in length to corolla; anthers small; cells 2, finally confluent in one above and hence hippocrepiform-rimose. Germen subglobular or at base adnate to receptacular cavity and disk, glabrous; cells 3, 1-ovulate; style slender, 3-lobed at stigmatose apex. Fruit drupaceous finally coriaceous subdry subglobular, surrounded at base with the somewhat enlarged and adnate cupule of receptacle, 3-coccous; cocci chartaceous, perforated at the base, finally separate and dehiscent within. Testa of suberect broadly oblong plano-convex seed coriaceous; albumen fleshy; cotyledons of somewhat fleshy embryo orbicular; radicle short inferior. Other characters

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[1] A genus very often referred to *Colletia*, of which, with others following, it would be better regarded as a section, notwithstanding the form of the perianth and receptacle and the structure of the disk, the nature of the pericarp, the twigs imperceptibly or not at all articulate, characters apparently here of no moment.

[2] Spec. 10–12. Spreng. *Syst. Cur. Post.* iv. 108 (*Condalia*).—Vent. *Jard. Cels*, 92, t. 15 (*Colletia*).—Hook. and Arn. *Bot. Misc.* iii. 173.—Ad. Br. *Rhamn.* 59, n. 1, 4 (*Colletia*).—A. Rich. *Voy. Astrol. Bot.* t. 14 (*Colletia*).—Hook. *Icon.* t. 538 (*Colletia*).—Raoul, *Ch. de Pl.* 29.—C. Gay, *Fl. Chil.* ii. 19 (*Rhamnus*), 35–37 (*Colletia*), 38 (*Ochetophila*).—Hook. f. *Fl. Tasm.* i. 69; *Fl. Ant.* ii. 255 (*Colletia*); *Man. N.-Zeal. Fl.* 43.—Reiss. *Mart. Fl. Bras. Rhamn.* t. 35.—Walp. *Ann.* vii. 605.

[3] *Gen.* 70; *Comm.* 50.—Endl. *Gen.* n. 5732.—Miers, *Contrib.* i. 284.—B. H. *Gen.* 384, n. 30.

of *Colletia* (or *Discaria*). A very ramose shrub; leaves very small opposite linear-lanceolate entire; stipules minute subpersistent (finally fuscate); branches and twigs rigidly spinescent, articulate at nodes; flowers axillary cymose. (*Mexico*, *Columbia*, *Bolivia.*[1])

36 ? **Retanilla** Ad. Br.[2]—Flowers of *Colletia*, 4–5-merous; tube of campanulate or urceolate calyx generally far produced beyond disk; lobes ovate-acute, valvate. Petals 4, 5, inserted in hollows of neck of calyx, small, cucullate. Disk covering base of calyx-tube and produced upwards, tapering from bottom to top, unlimited. Stamens 4, 5; anthers subpeltately affixed and opening in 2 valves by subtransverse cleft. Germen sessile, or free, or slightly adnate at base to receptacle and disk, pilose, 3-locular; style conical or cylindrical columnar, 3-lobed at stigmatose apex. Fruit drupaceous globular, girt at base with short cupule of receptacle; exocarp fleshy or spongy; putamen hard, 3-locular. Seeds suberect; testa crustaceous, raphe lateral percurrent; micropyle finally lateral; albumen fleshy; cotyledons of straight embryo flat subelliptical; radicle short inferior and other characters of *Colletia.*—Shrubs or undershrubs[3] subaphyllous ramose; branches virgate, 2–3-chotomously ramose terete spinescent; leaves obsolete or opposite minute very entire the smallest most caducous; stipules minute scarious, persistent; flowers in short compound cymose ramules, shortly pedicellate. (*Peru*, *Chili.*[4])

37. **Talguenea** Miers[5].—Flowers nearly of *Colletia*; tube of calyx membranous, lined with hairs (not a glandular disk), cylindrically attenuated above, at base generally obconical and far produced beyond disk, somewhat contracted at neck. Petals 5, inserted between lobes of calyx neck, small cucullate. Stamens same in number inserted with and opposite to petals; filaments complanate

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[1] Spec. 1. *A. infesta* Meissn.—A. Gray, *Pl. Wright.* 34.—*Colletia infesta* Ad. Br. *Rhamn.* 59, n. 5.—*Ceanothus infestus* H. B. K. *Nov. Gen. et Spec.* vii. 61, t. 614.—*Colubrina infesta* Schltl, *Linnæa*, xv. 468.

[2] *Rhamn.* 57, t. 3.—Endl. *Gen.* n. 5734.—B. H. *Gen.* 384, n. 31.—*Retamilia* Miers, *Ann. Nat. Hist.* ser. 3, v. 483; *Contrib.* i. 285, t. 39 DE.—*Molinæa* Commers. MSS. not of others.

[3] Habit of *Ephedræ.*

[4] Spec. 2, 3. Vent. *Jard. Cels*, t. 92; *Choix de Pl.* t. 16 (*Colletia*).—Poir. *Dict.* Suppl. ii. 311, n. 1 (*Colletia*).—DC. *Prodr.* ii. 28 (*Colletiæ* sect. *Retanilla*).—Lodd. *Bot. Cab.* t. 1820 (*Colletia*).—Hook. *Bot. Misc.* i. 157; iii. 173.—C. Gay, *Fl. Chil.* ii. 25.—Phil. *Linnæa*, xxviii. 679.—Walp. *Ann.* vii. 606.

[5] *Trav. Chili*, ii. 529; *Ann. Nat. Hist.* ser. 3, v. 6; *Contrib.* i. 296, t. 41.—Endl. *Gen.* n. 5735.—B. H. *Gen.* 385, n. 33.

pilose; anthers subpeltate, 2-locular, finally confluently rimose and opening very widely transversely. Germen immersed in bottom of tube, sometimes hirsute, sub-3-lobed, 3-locular; style slender hirsute, 3-lobed at stigmatose apex. Fruit "carcerular chartaceous very hirsute oblong, enclosed by unchanged calyx, a little longer than it, apiculate to style, indehiscent; cells 1–3, 1-spermous; seeds of of *Colletia*.[1]" A highly branched shrub; branches opposite; the younger ones spinous; leaves opposite membranous oblong, entire or serrate, 5-nerved at base, sericious beneath, stipules small scarious; inflorescence and other characters of *Retanilla* or *Colletia*. (*Chili*[2].)

38 ? **Trevoa** Miers.[3]—Flowers nearly of *Colletia*; calyx membranous, subcampanulate or long urceolate ampullaceous, lined with hairs not a glandular disk; tube far produced beyond receptacle; limb 4–5-lobed, valvate. Petals 4, 5, inserted between lobes of calyx-neck, very cucullate. Stamens same in number opposite to and enclosed by petals; filaments short pilose; anthers subpeltate, confluently rimose and finally opening very wide transversely in 2 valves. Germen semi-immersed at bottom of tube, sub-2–3-lobed, 2–3-locular very hirsute; style straight pilose, 2–3-lobed at stigmatose apex. Fruit drupaceous ovoid, girt at base with persistent cupule of receptacle; putamen rather hard nutlike, 1–3-locular; seeds and other characters of *Retanilla* (or *Talguenea*); testa nitid, raphe lateral percurrent; micropyle finally lateral; albumen fleshy; cotyledons of straight embryo suborbicular or shortly elliptical; radicle short inferior.—Very ramose leafy shrubs; branches not sulcate; leaves opposite, ovate or obovate, serrulate, 3-nerved at base; stipules deciduous; inflorescence and other characters of *Colletia*. (*Bolivia, Chili*.[4])

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[1] Char. from Miers, *loc. cit.*

[2] Spec. 2. Gill. and Hook. *Bot. Misc.* i. 158, t. 45 B. (*Trevoa*).—Bert. from Colla, *Mem. Torin.* xxxvii. 53, t. 7 (*Colletia*).—C. Gay, *Fl. Chil.* ii. 23 (*Trevoa*).—Walp. *Ann* vii. 607.

[3] *Trav. Chili*, 529; *Ann. Nat. Hist.* ser. 3, v. 488; *Contrib.* i. 291, t. 40.—B. H. *Gen.* 384, n. 32.

[4] Spec. 5 (Miers). Hook. *Bot. Misc.* i. 157; iii. 174 (*Retanilla*).—C. Gay, *Fl. Chil.* ii. 27 (*Retanilla*), 31 (*Colletia*).—Walp. *Ann.* viii. 607.

XLVIII. PENÆACEÆ.

In this small family, the flowers are regular, tetramerous, monoperianthous and hermaphrodite. Those of *Penæa*[1] (fig. 58–66) have their floral envelope tubular or conical, coloured,[2] surmounted by four lobes, two lateral, an anterior and a posterior, in prefloration valvate in the bud (fig 60). In the intervals, on the same level, are inserted an equal number of alternate stamens, each formed of a very short filament and a bilocular and introrse anther.[3] The two cells

Penæa myrtifolia.

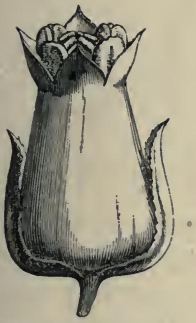

Fig. 59. Flower ($\frac{4}{1}$).

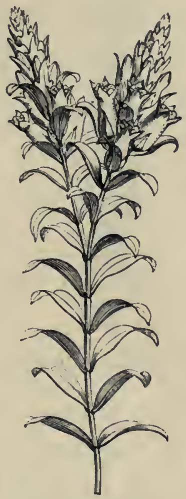

Fig. 58. Habit.

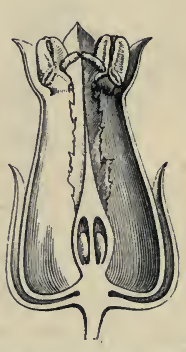

Fig. 61. Long. sect. of flower.

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[1] L. *Hort. Cliff.* 37; *Gen.* n. 138 (not Plum. not Lour.).—Adans. *Fam. des Pl.* ii. 225.—J. *Gen.* 419.—Gærtn. f. *Fruct.* iii. 243, t. 225.—Poir. *Dict.* vi. 538 (part.).—K. *Linnæa*, v. 676 (part.).—A. Juss. *Ann. Sc. Nat.* sér. 3, vi. 22, t. 1.—Endl. *Gen.* n. 2116.—H. Bn. *Payer Fam. Nat.* 333; *Adansonia*, xi. 287.—A. DC. *Prodr.* xiv. 484.

[2] White or pink. The nature of the tube (which we here only provisionally attribute to the perianth, and which we shall call a calyx only in imitation of most authors), could not be definitely determined independently of the study of the development. But it is probable from what we observe in the neighbouring groups, that it represents a receptacular organ, bearing at its upper orifice the true perianth, represented by the lobes and the andrœcium, whilst the bottom supports the gynæcium, hence doubtless a striking analogy between *Penæa* and *Colletia.*

[3] The pollen is (H. Mohl, *Ann. Sc. Nat.*

occupy a small inferior portion of the internal face of a thick and elongated connective, and open by a short oblique cleft. At the bottom of the flower, the receptacle rises in a short cone which supports four free carpellary leaves alternate with those of the perianth.[1] Each presents to our notice an inferior ovarian portion enlarged, concave within and furnished with an internal median ridge; an attenuated stylary portion, and a stigmatiferous extremity more or less dilated. At its edges, it is in contact with the neighbouring carpellary leaves without effecting any adherence with them at any age; these four pistillar leaves are valvate with each other in prefloration; and, by their dilated ovarian portions, they thus circumscribe four cells superposed to the leaves of the perianth and consequently alternate with the divisions of the style. Near the base of each carpellary leaf are inserted two ovules, separated from each other by the base of the prominence formed by the internal longitudinal ridge; and thus two ovules are found enclosed in each of the cavities of the ovary. They are collateral, ascending, ana-

Penæa myrtifolia.

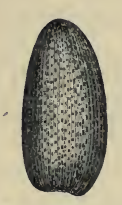

Fig. 64. Seed ($\frac{5}{1}$).

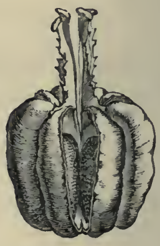

Fig. 63. Dehiscing fruit.

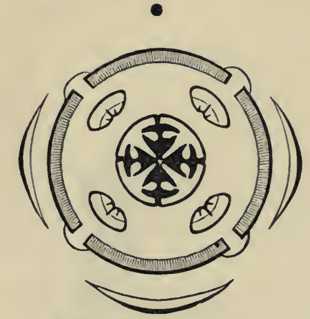

Fig. 60. Diagram.

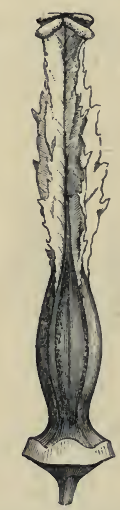

Fig. 62. Gynæcium ($\frac{8}{1}$).

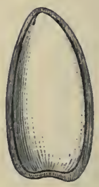

Fig. 65. Open seed.

Fig. 66. Embryo.

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sér. 2, iii. 314) ovoid, with six or eight longitudinal furrows. In water it becomes spherical, with bands, three of which alternately bear papillæ.

[1] On the structure of the gynæcium and the mode of placentation, see H. Bn. '*Adansonia*, xi. 228. The branches of the style correspond, not to the cells, but to the incomplete ovarian partitions.

tropal and primarily the micropyle is directed downwards and inwards so that the raphe is dorsal; but later a slight twist occurs which causes the raphes to approach, whilst the micropyles become more or less lateral. The fruit, to which the perianth remains for a longer or shorter time persistent and accrescent, is capsular, loculicidal, separating into four equal valves extending from the base to the summit of the persistent style. Each cell contains one or two ascending seeds, the coats of which enclose a fleshy large-footed embryo, nearly conical, with inferior obtuse or depressed radicle, and two very short superior cotyledons, separated from each other by a vertical cleft scarcely visible (fig. 65, 66). The *Penœas* are small suffrutescent and ericoid plants from South Africa. Their persistent leaves are opposite, entire, coriaceous, sessile or nearly so, accompanied by two very small blackish glanduliform stipules. The flowers are solitary in the axils of the upper leaves of branches, which are often transformed to coloured bracts, so that the whole constitutes a small terminal spike. Each is accompanied by two lateral bracteoles.[1]

In some species, as *P. ericoides* and *fruticulosa*, the gynæcium differs from that of the *Penœas* proper, in that the back of each carpellary leaf presents only a more or less salient angle, instead of being prolonged to a vertical membranous irregularly slashed wing, extending from the stigmatic lobe nearly to the top of the ovary (fig. 61–63). For this reason they have been separated generically under the name of *Stylapterus*;[2] but we can make of them only a section of the genus *Penœa*. Thus understood, the latter comprises seven or eight species.[3]

The *Sarcocols*, plants of the same country, with the same foliage and the same habit as *Penœa*, with which they were formerly classed, have generally larger flowers, the petaloid perianth of which has a cylindrical tube, surmounted by a limb with four reduplicate-valved lobes. In the *Sarcocols* proper, such as *S. formosa*, *fucata*, the tube is elongated and the stamens have a long filament;

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[1] If there are four instead of two, the lateral are the more exterior, and the interior are, one anterior and the other posterior (*P. fruticulosa*).

[2] A. Juss. *loc. cit.* 23, t. 1, fig. 2.—A. DC. *Prodr.* xiv. 486.

[3] L. *Spec.* ed. 2, 162.—L. F. *Suppl.* 121.—Thunb. *Fl. Cap.* 149.—Vent. *Malmais*, t. 87.—Meissn. *Hook. Journ.* (1843), 456 *bis*.—Meerb. *Icon.* t. 51.—Lodd. *Bot. Cab.* t. 1770.—Krauss, *Flora* (1845), 76.

which causes them soon to become exserted. In others, as *S. speciosa*, the tube is also very long, but the staminal filaments are so short that the anthers remain enclosed. Thus the former species are united gradually to *S. acuta*, *rupestris*, etc., of which a genus *Brachysiphon* has been made and of which, the stamens being also enclosed, the tube of the perianth remains relatively shorter.

Endonema, formerly classed with *Sarcocolla*, is distinguished by each of the ovarian cells enclosing two pairs of, instead of two, ovules. Those of the upper pair are ascending with inferior micropyle; those of the lower pair, descending, with superior micropyle. All have a dorsal raphe. Sometimes the lobes of the perianth are valvate, as in the true *Endonema*, and sometimes they are reduplicate, as in the section *Glyschrocolia*. The stamens are shorter or longer than the perianth. *Endonema* is from the same country as *Sarcocolla* whose organs of vegetation it has.

This small family, according to LINDLEY[1] was verbally established by him in 1820. JUSSIEU had left *Penæa* among the *Genera of uncertain place*.[2] In 1830, KUNTH[3] divided the old genus *Penæa* of LINNÆUS and THUNBERG into three genera; *Penæa*, *Sarcocolla* and *Geissolomeæ*. But ENDLICHER,[4] in 1841, placed the *Geissolomeæ* in a small distinct group, following the *Penæaceæ*, which consequently, according to him, contained only *Penæa* and *Sarcocolla*. In 1846, A. DE JUSSIEU, in a note on the family of *Penæaceæ*,[5] added to the preceding genera *Stylapterus* and *Brachysiphon*, which we cannot retain, and the genus *Endonema*, to which should be added one of the three species of *Sarcocolla* admitted by him, and of which A. DE CANDOLLE, in 1867,[6] made a genus *Glyschrocolla*, proposed by ENDLICHER[7] as a section of *Sarcocolla*. Summing up, the *Penæaceæ* with us number only three genera, comprising some twenty species, all natives of the Cape, all frutescent or suffrutescent,[8] with opposite persistent leaves, regular apetalous isostemonous flowers, gynæcium, like the other verticils of the flower, tetramerous, seed exalbuminous with fleshy large-footed embryo, and differing generically one from another only in the prefloration of the perianth and the number of ovules contained in each cell; either two ascending, or four, of which two are ascending and two descending, but whatever the direction, always having the micropyle interior and the raphe dorsal.

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[1] *Introd.* 71; *Veg. Kingd.* (1846), 577, Ord. 209.—SWEET, *Hort. Brit.* (1827), 488.

[2] *Gen.* (1789), 419.

[3] *Linnæa*, v. (1830), 676.

[4] *Enchirid.* 213, Ord. 112; *Gen.* 335.

[5] *Ann. Sc. Nat.* sér. 3, vi. 15.

[6] *Prodr.* xiv. 483, Ord. 165.

[7] *Gen.* Suppl. iv. 73.

[8] The transverse section of the wood generally has a square or lozenge shape, in accordance with the arrangement of the leaves. In the medullary cellules and in those of the vertical parenchyma is found a yellowish or brownish resinous substance, in appearance much resembling the gum-resins of the *Burseræ*, and also certain *Sarcocols*, probably spurious, found here and there in commerce.

We have shown[1] that the *Penœaceæ* approach the *Colletieæ* on the one hand, and the *Aquilarieæ* on the other; but that, from the one as well as from the other, they are immediately distinguished by the very singular organization of the gynæcium, unexampled apparently in the Vegetable Kingdom, consisting of four carpellary leaves, independent from each other at every age, valvate, with styles superposed to the partition separating the cells. The latter have their dorsal wall formed of the adjoining halves of two different carpellary leaves.

To several *Penœaceæ* is attributed the production of a viscid, sweetish and somewhat nauseous substance, used by the ancient physician under the name of *Sarcocol*.[2] The genus which has thence derived its name is, in particular, rich in a resinous waxy glue; but the real source of this kind of balm, formerly so extolled for healing wounds, is not yet determined.

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[1] *Adansonia*, xi. 289.

[2] It is said to be the Σαρκοκόλλα of DIOSCORIDES. The Arabs call it *Unzeroot*. It contains a sweetish principle (*sarcocollin*), and is said to be brought from Ethiopia. There is no proof, says ENDLICHER (*Enchirid.* 214), that it comes from the *Penæaceæ*, as DIOSCORIDES makes it come from Persia, and MÉSUÉ reports that it exudes from a spinous tree. It is not known whether the Persians obtained it from their own country or from Africa. The *Sarcocol* of commerce resembles a pale yellowish, odorous, somewhat bitter incense, often mixed with the fruits of the Umbelliferæ, as *Sagapenum Galbanum*.

GENERA.

1. **Penæa** L. — Flowers hermaphrodite regular apetalous, 4-merous; perianth (coloured) shortly tubular or conical; lobes a little shorter, valvate. Stamens 4, alternate with lobes, inserted in neck; filaments very short; anthers introrse enclosed; connective basifixed thick somewhat compressed; cells much shorter, inferior oblique rimose; fimbrilli-ciliate. Gynæcium superior; carpels 4, oppositipetalous, dilated at base (by germen), concave within, contiguous at margin, valvate (not coadunate), dorsally angular apterous (*Stylapterus*), or oftener produced to a vertical vittæform wing to the top of the style (*Eupenæa*), at the base internally produced to a thick free septum (contiguous within and hence dividing the germen into four cells, not connate); styles 4, free, approximating to a 4-sulcate column, cruciately dilated at stigmatose apex. Ovules in cells 2, collaterally ascending suberect; micropyle introrsely inferior. Capsule clothed with augmented perianth, loculicidally 4-valvate; valves septiferous within, 1–2-spermous. Seeds suberect; testa crustaceous; radicle of thick exalbuminous fleshy ovoid-conical embryo inferior thick truncate or concave; cotyledons 2, superior very small, visible from a very short cleft or almost entirely conferruminate.—Evergreen undershrubs; leaves opposite imbricate, entire ericoid or oftener flat coriaceous; stipules very small lateral glanduliform (blackish); axils often setiferous; flowers in axils of uppermost leaves (sometimes changed into coloured bracts) solitary subsessile, decussately bracteolate. (*Cape of Good Hope.*) See p. 95.

2. **Sarcocolla** K.[1]—Flowers nearly of *Penæa* (larger); perianth-tube[2] oblong; lobes shorter than tube (*Eusarcocolla*[3]) or subequal

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[1] *Linnæa* (1830), 677.—Endl. *Gen.* n. 2117. —A. Juss. *Ann. Sc. Nat.* sér. 3, vi. 25 (part.). —H. Bn. *Payer Fam. Nat.* 334; *Adansonia*, xi. 287.—A. DC. *Prodr.* xiv. 488.

[2] Persistent, accrescent, coloured.

[3] Endl. *Gen.* Suppl. iv. p. ii. n. 2117 *a*.

(*Brachysiphon*[1]), or valvate (*Euclissa*[2]), or oftener reduplicate-valved (*Eusarcocolla*, *Anaclissa*.[3]) Stamens inserted in neck; filaments free, either long exserted (*Eusarcocolla*), or short enclosed (*Brachysiphon*); anthers shorter more or less than connective or subequal, introrse. Gynæcium of *Penœa* (exalate); style slender elongate; ovules in cells 2 and other characters of *Penœa*.—Undershrubs;[4] leaves opposite generally flat, imbricate; stipules very small; flowers axillary solitary, more or less approaching the apex of the branches (spuriously spicate or capitate); bracts oftener expanded or attenuated, coloured. (*Cape of Good Hope*.[5])

3. **Endonema** A. Juss.[6]—Flowers of *Sarcocolla*; perianth valvate (*Euendonema*[7]) or reduplicate (*Glyschrocolla*.[8]) Stamens 4; filaments rather long. Germen-cells 4, 4-ovulate; 2 ovules ascending; micropyle introrsely inferior; the other 2 descending; micropyle introrsely superior. Capsule wingless, loculicidally 4-valvate; seeds in cells 1–3, or sometimes 4 (2 ascending; but 2 descending); funicle swollen arilliform; testa produced to a cupule at apex;[9] embryo and other characters of *Sarcocolla* (or *Penœa*).—Shrubs or undershrubs; habit and leaves of *Sarcocolla*; flowers axillary often to upper leaves solitary; bracts imbricate, sometimes coloured. (*Cape of Good Hope*.[10])

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[1] A. Juss. *loc. cit.* 24, t. 2, fig. 3. — Endl. *Gen.* n. 2116^1 (Suppl. iv. 73).

[2] Endl. *loc. cit.* (*Brachysiphon*, sect. *a*).

[3] Endl. *loc. cit.* sect. *b*.

[4] Often unctuous-resinous.

[5] Spec. about 10. L. *Mantiss.* 199, 331 (*Penœa*).—Thunb. *Fl. Cap.* 149 (*Penœa*).—Berg. *Cap.* 36 (*Penœa*).—Lamk. *Ill.* i. 317, t. 78 (*Penœa*). — Poir. *Dict.* vi. 540 (*Penœa*).—Grah. *Bot. Mag.* t. 2809 (*Penœa*).—*Bot. Reg.* t. 106 (*Penœa*).

[6] *Ann. Sc. Nat.* sér. 3, vi. 19, 26, t. 3.—Endl. *Gen.* n. 2117^1.—H. Bn. *Payer Fam. Nat.* 334.

[7] *Endonema* A. DC. *Prodr.* xiv. 490.

[8] A. DC. *loc. cit.*—*Sarcocollæ* sect. *Glyschrocolla* Endl. *Suppl.* iv. 75.

[9] The swollen part of the funicle interior to the dorsal margin of this cupule, afterwards attenuated seems to penetrate within the substance of the integument itself, and is there produced in a white raphe to the chalaza.

[10] Spec. 3, 4. Thunb. *Naturf. Mag. Berl.* i. t. 3, fig. 2 (*Penœa*).—A. Juss. *loc. cit.* 26 (*Sarcocolla*).

XLIX. THYMELÆACEÆ.

1. AQUILARIA SERIES.

Aquilaria[1] (fig. 67–69), the name of which has been given to a family long admitted as distinct, consists of plants with hermaphrodite, regular and monoperianthous flowers. The floral receptacle[2] has the form of an obconical or nearly hemispherical sac, on the margin of which are inserted five or six obtuse sepals, imbricate in prefloration. More internally, from the throat of the receptacle spring[3] ten or twelve stamens, perigynous like the sepals to which five of them, somewhat longer, are superposed, whilst the five or six others, belonging to another verticil, are alternate. Each is formed of a filament, very short or almost nil, often long[4] enough for the

Aquilaria malaccensis.

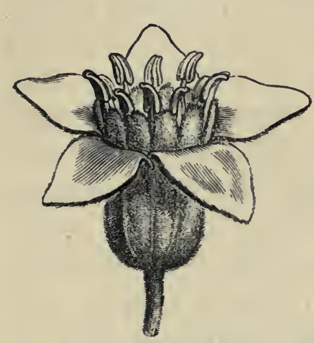

Fig. 67. Flower ($\frac{5}{1}$).

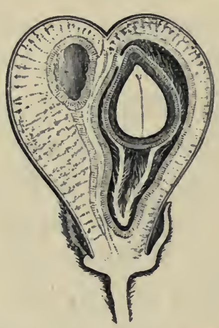

Fig. 69. Long. sect. of fruit ($\frac{3}{2}$).

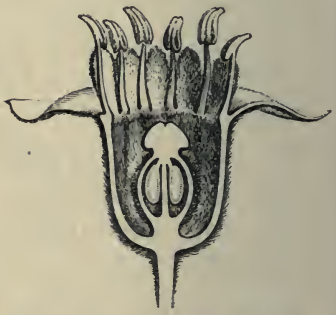

Fig. 68. Long. sect. of flower.

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[1] Lamk. *Dict.* i. 49; Suppl. ii. 709; *Ill.* t. 356. — DC. *Prodr.* ii. 59. — Spach, *Suit. à Buffon*, xiii. 289.—Turp. *Dict. Sc. Nat.* Atl. t. 248.—Lindl. *Veg. Kingd.* 579, fig. 392.—Endl. *Gen.* n. 2111.—H. Bn. *Payer Fam. Nat.* 332; *Adansonia*, xi. fasc. 10.—Meissn. *DC. Prodr.* xiv. 601.—*Ophispermum* Lour. *Fl. Cochinch.* (ed. 1790), 280.—*Agallochum* Rumph. *Herb. Amboin.* ii. 34, t. 10.

[2] This corresponds to what, in all descriptions, is considered as the tube of the perianth. It is lined with a very thin glandular layer, covered with hairs; and it is this disk which, thickening at the throat, there separates into alternipetalous tongues described a little farther on.

[3] Their course can be traced lower down on the internal face of the receptacle in the form of a slightly prominent thread. Their presence here is owing to the late development of the receptacular cup which, at first, is scarcely concave and afterwards enlarges from top to bottom as it becomes more pronounced.

[4] In some species it separates clearly a little after fecundation, following a transverse line, a little above the point where it becomes free. Its upper portion generally begins to change before this disarticulation.

anther with which it is surmounted to be partly or wholly exserted. The latter is formed of a connective continuous with the summit of the filament and to the internal face of which are applied throughout their entire length the parallel and independent cells of the anther, dehiscing introrsely by a longitudinal cleft. With the stamens alternate ten or twelve obtuse or flattened tongues which occupy the intervals[1] and are covered with whitish hairs. At the bottom of the floral receptacle is inserted a sessile gynæcium, the ovary of which, generally dicarpellar[2], is surmounted by a short style, dilated above to a stigmatiferous head with more or less salient lobes. The ovary is divided into two cells, complete or incomplete,[3] each of which encloses, in its internal angle, a descending anatropous ovule, with micropyle directed upwards and outwards.[4] The fruit is a drupe, but slightly fleshy, finally dry or nearly so, obovate or obcordate, attenuated at base to a sort of foot around which persist the perianth, and a portion of the andrœcium; compressed perpendicularly to the partition which divides it into two cells. It opens marginally into two valves, septiferous in the middle of their internal face, and encloses one or two seeds the coats[5] of which are prolonged inferiorly to a sort of chalazine horn[6] and cover a fleshy embryo, with short superior radicle and thick plano-convex cotyledons. Of one species of *Aquilaria* from the Philippines a genus *Gyrinopsis*[7] has been made, because it has a receptacular sac longer in tube and very short staminal filaments. *Aquilaria* comprises trees and shrubs from tropical Asia and the warmest regions of Malaya. They have alternate leaves, entire or nearly so, penninerved, with numerous secondary nervures, linear and parallel, and terminal lateral or axillary flowers,[8] arranged in simple or more or less compound umbels. Four or five species are described.[9]

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[1] While the sepals are reflexed.

[2] Here and there with three carpels.

[3] They have always appeared to me complete, though the separating partition is formed of two halves meeting along the middle line with margins tolerably thick, but not uniting and easily separable with the slightest traction. Always in *Lachnolepis* (Miq. *Ann. Mus. Lugd. Bat.* i. 132), to us unknown, but apparently ought not, for this single character, to be separated from the other *Gyrinops*, the two parietal placentæ remaining, it is said, but slightly salient.

[4] With double envelope.

[5] The exterior is crustaceous, blackish, often covered with small salient scales.

[6] The prolonged external coat envelopes this conical projection. When it decays (which happens sooner or later), it lays bare a bundle of long hairs, originally planted on the chalazaic region, afterwards disengaged, but previously united in a brush in this kind of sheath which keeps them together

[7] Dcne. *Ann. Sc. Nat.* sér. 2, xix. 41, t. 1 B.—Meissn. *Prodr.* 602.

[8] Greenish or reddish.

[9] Spreng. *Syst.* ii. 356.—Roxb. et Colebr. *Trans. Linn. Soc.* xxi. iii. 119, t. 21.—Roxb.

Gyrinops Walla[1] (fig. 70, 71), a shrub from Ceylon, similar to *Aquilaria* in its organs of vegetation, differs in that the throat of its narrowly tubular receptacle gives insertion to only five oppositipetalous stamens and to an equal number of alternate scales, forming by their contiguity a short collarette covered with hairs, and in that their bilocular ovary is supported by a long foot.[2]

Gyrinops Walla.

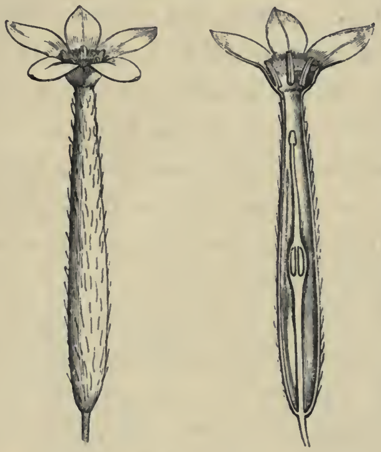

Fig. 70. Flower ($\frac{4}{1}$). Fig. 71. Long. sect. of flower.

Phaleria,[3] shrubs from all the tropical regions of Asia and Oceania, differs directly from the preceding genera by its opposite leaves. The flowers have also a long tubular receptacle, but coloured and petaloid, as well as imbricate sepals,[4] to the number of four or five, which are inserted in the throat. It is lined with a very thin disk which thickens only at the throat and there terminates in a straight or festooned edge, or is dilated into lobes which project into the intervals between the superior stamens. The latter are the same in number as the parts of the perianth to which they are superposed, whilst the alternate stamens are situated lower down on the receptacular tube. All are composed of one filament of variable length and one bilocular and introrse anther, dehiscing by two longitudinal clefts. The ovary, with two or often a single cell, is surrounded at the base by a cupuliform and membranous disk, entire or lobed, and surmounted by a style, like the staminal fila-

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Fl. Ind. ii. 422.—Cav. *Diss.* vii. 377, t. 224.—Royl. *Ill. Himal.* 173, t. 36.—Hook. *Icon.* t. 6.—Benth. *Hook. Kew Journ.* v. 195; *Fl. Hongk.* 297.—Miq. *Fl. Ind.-Bat.* i. p. i. 882; Suppl. i. 141 (part.).—H. Bn. *Adansonia*, xi. fasc. 10.

[1] Gærtn. *Fruct.* ii. 276, t. 140.—DC. *Prodr.* ii. 60.—Arn. *Lindl. Nat. Syst.* ed. 2, 442.—Hook. *Icon.* t. 5.—Endl. *Gen.* n. 2110.—Thw. *Enum. Pl. Zeyl.* 251.—Meissn. *Gen.* 73; *Prodr.* 602, 700.—H. Bn. *Payer Fam. Nat.* 333.

[2] At its base exists a small glandular swelling, scarcely perceptible.

[3] Jack, *Mal. Misc.* (1820-22).—Hook. *Comp. to Bot. Mag.* i. 156.—Endl. *Gen.* n. 2109.—H. Bn. *Adansonia*, xi. fasc. 10.—*Drymispermum* Reinw. *Syll. Nov. Pl. Ratisb.* (1818), 15, t. 2.—Meissn. *Prodr.* 603.—*Pseudais* Dcne. *Ann. Sc. Nat.* sér. 2, xix. 49.—*Leucosmia* Benth. *Hook. Lond. Journ.* ii. 231; *Voy. Sulph. Bot.* 179, t. 57 (in some copies.).—*Plutonia* Noronh. (ex Hassk.).

[4] Which are the lobes of the calycinal limb according to most authors; generally white, like the tube.

ments, of very variable length,[1] dilated at the summit to a stigmatiferous head more or less lobed. The fruit is a slightly fleshy drupe, with one or two seeds the fleshy embryo of which is destitute of albumen. Some dozen[2] species of *Phaleria* are described; the flowers are arranged in short, often umbelliform, spikes, terminal or axillary, surrounded by imbricate bracts forming an involucre.[3]

Instead of being elongated, as in the flower of *Phaleria* and of *Gyrinops*, the receptacle of *Aquilaria* may become short, cupuliform; so that the perigyny there becomes much less distinct. This occurs in *Gonistylus*, a tree from the Indian Archipelago, which has alternate leaves, five sepals, ten stamens, some thirty scales in their intervals, four or five cells in the ovary and a large bacciform fruit. By the form of its receptacle, it is intermediate between the preceding genera and *Octolepis*, a genus from tropical and western Africa, whose leaves are alternate, and its tetramerous and diplostemonous flowers have a receptacle almost flat, with an insertion, consequently, scarcely perigynous, and an ovary almost entirely superior, with four uniovulate cells.

II. THYMELÆA SERIES.

We commence the study of this series, not by *Thymelæa*, from which it has derived its name, nor by *Daphne*, the best known representative in our country, but by the most complete types, such as those presented in their flowers by *Linostoma*[4] (fig. 72, 73). It may be said of these that, but for their unicarpellar gynæcium, they would be altogether inseparable from *Aquilaria*.[5] They have regular, hermaphrodite pentamerous flowers. The concave receptacle,[1] in the form of a reversed cone, bears on its margin the five divisions of the calyx, quincuntially imbricate, then open or even reflexed in anthesis. In the throat are inserted with and superposed to them five stamens each formed of a free filament and an exserted and introrse anther, bilocular and dehiscing by two longitudinal clefts. Five other stamens, alternate with and shorter than the preceding, of the same organisation, constitute a second verticil; and with the ten parts of the andrœcium alternate an equal number of glands, also inserted in the throat, elongate, nearly petaloid, glabrous, obtuse[2] at the summit, long contracted towards the base. The gynæcium is quite at the bottom of the receptacle, accompanied at the base by ten very small hypogynous glands each of which corresponds to a prolongation of one of the stamens. The ovary is free, nearly sessile, covered with hairs, surmounted by a terminal slender style, the exserted summit of which is dilated to a stigmatiferous head. In the single cell of the ovary is seen a parietal placenta bearing, a little below the summit, a single descending anatropous ovule, with micropyle superior and exterior. The fruit is a naked drupe (?), finally dry, enclosing one descending seed, with thick fleshy embryo and short superior radicle, and accompanied by an unabundant fleshy albumen. *Linostoma*, of which only one or two Indian[3] species are known, consists of glabrous

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[1] "Genitalibus, more quarumd. *Rubiac.* etc. dimorphis." (A. Gray, *Seem. Journ. of Bot.* iii. 305.)

[2] Forst. *Prodr.* 33, 192 (*Dais*).—Wikstr. *Thymel.* 349 (*Dais*).—Gaudich. *Voy. Uran. Bot.* 443, t. 44 (*Dais*).—Bl. *Bijdr.* 651 (*Dais*).—Dcne. *Ann. Mus.* iii. 41 (*Dais*); *Ann. Sc. Nat.* sér. 2, xix. 38, t. 1 A (*Drymispermum*); *Voy. Venus*, *Bot.* 13, t. 10–12 (*Drymispermum*); 17 (*Leucosmia*).—Zoll. *Verz.* ii. 117 (*Drymispermum*).—A. Gray, *loc. cit.* 305 (*Leucosmia*).—Thw. *Enum. Pl. Zeyl.* 251 (*Drymispermum*).—Miq. *Fl. Ind-Bat.* i. p. i. 883 (*Pseudais*), 884 (*Drymispermum*); Suppl. i. 142 (*Drymispermum*).—Seem. *Fl. Vit.* 207 (*Drymispermum*).—F. Muell. *Fragm.* v. 26; vii. 1 (*Drymispermum*).—Hook. f. *Bot. Mag.* t. 5787.—Benth. *Fl. Austral.* vi. 37.

[3] The genus *Skaphium* (Miq. *Fl. Ind.-Bat.* Suppl. i. 142), very imperfectly known, appears tolerably analogous to *Phaleria* by its fruit, but it differs, apparently, in its mode of inflorescence. Its flower must be analysed.

[4] Wall. *Cat.* n. 4203.—Endl. *Gen.* n. 2102; Suppl. iv. p. ii. 67, n. 2106^{4}.—Meissn. *Denkschr. Bot. Ges. Regensb.* iii. 293, t. 7; *Prodr.* 599, 700.—*Nectandra* Roxb. *Fl. Ind.* (ed. 1832), ii. 425 (not Berg. nor Rottb.).—*Eulinostoma* Meissn. *Mart. Fl. Bras. Thymel.* 71.

[5] And *Phaleria* may have, as we have seen, a unilocular ovary.

Linostoma decandrum.

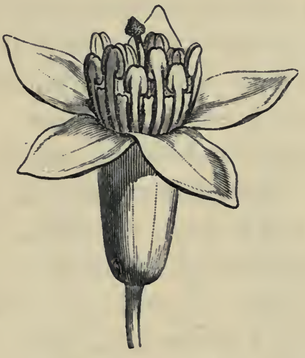

Fig. 72. Flower ($\frac{4}{1}$).

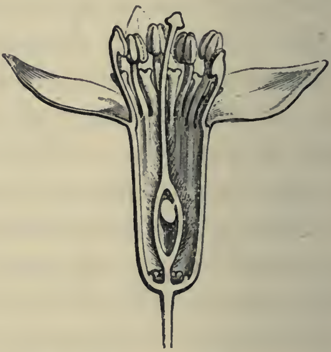

Fig. 73. Long. sect. of flower.

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[1] Such is probably the signification of the tube which, in generic descriptions, we shall often refer to the perianth, following most authors, the question being still undecided. On these coats are delineated more or less clearly the linear descending threads of the staminal filaments, partly concealed by hairs.

[2] Or more or less crenate.

[3] Griff. *Calc. Journ. of Nat. Hist.* iv. 234, not.—Walp. *Ann.* i. 587.

shrubs, with opposite leaves, without stipules, entire, penninerved, and terminal flowers arranged in umbelliform cymes and accompanied by leaves modified as to form and consistence.

Close to *Linostoma* ranges *Lophostoma*, a beautiful tree from the region of the Amazon, which, with the same leaves and the same floral organisation, presents short and hairy alternipetalous glands, an ovary destitute of hypogynous disk, and a fruit with thin and dry pericarp, around which persists the accrescent perianth, almost vesiculate and thickened at the base to a sort of crenelated ring. *Synaptolepis*, a sarmentous shrub of Zanzibar, has likewise opposite leaves and pentamerous and decandrous flowers; but the perianth has the form of a horn still more narrow and elongate; and, above the oppositipetalous stamens, is seen, instead of free scales, a short collarette with entire or finely crenelate margin. The fruit is ovoid, closely surrounded by an induvium formed by the base of the perianth become fleshy and perforated at the summit; the flowers are axillary and solitary. In *Stephanadenia*, native shrubs of Madagascar, the habit is altogether different, and the leaves are alternate, elongate and pointed, with numerous fine pinnate nervures. The flowers, either arranged along a long and slender spike to which they are articulate, or gathered in a sort of umbel at its summit, are constructed nearly as those of the preceding genera. But the perianth has the form of a tube nearly cylindrical, and the throat bears, above two distant verticils of sessile anthers, a thick glandular collarette, spread out, and fringed with prominent papillæ. The gynæcium, supported by a very short foot, is composed of an ovoid ovary extending upwards in a terminal style with stigmatiferous extremity somewhat enlarged. In *Dicranolepis*, on the contrary, the scales of the throat of the limb attain so great a development, that they nearly equal the five divisions of the calyx and resemble a corolla. A pair of these large petaloid and coloured scales correspond to each interval between two neighbouring sepals. The andrœcium is equally diplostemonous, and the ovary is supported by a short foot surrounded by a disk in the form of a membranous sheath and surmounted by a style with a stigmatiferous claviform and elongated extremity. *Dicranolepis* consists of shrubs from tropical western Africa with distichous unsymmetrical leaves and axillary sessile flowers. *Gnidia* has also petaloid scales at the throat of the perianth, but they are much less developed. They are simple or double in each interval between two calycinal lobes. The latter are five in number in the species of which the genus *Lasiosiphon* has been made, and four in *Gnidia* proper, whose perianth often separates circularly above the ovary. The latter is generally surrounded at the base by a hypogynous disk of very variable dimensions. *Gnidia* has alternate or opposite leaves and flowers generally collected in terminal capitules surrounded by an involucre of imbricated floral leaves; more rarely they are axillary, solitary or grouped in spikes. They inhabit India, Madagascar and especially tropical eastern and southern Africa. *Lachnæa* (fig. 74–77), all natives of southern Africa, has always tetramerous flowers and eight stamens, four of which may be sterile; but, what is remarkable, these flowers are sometimes regular and sometimes irregular, with such transitions between the one form and the other, that it is quite impossible to divide the genus. The gynæcium is destitute of hypogynous scales, and those

Lachnæa rosea.

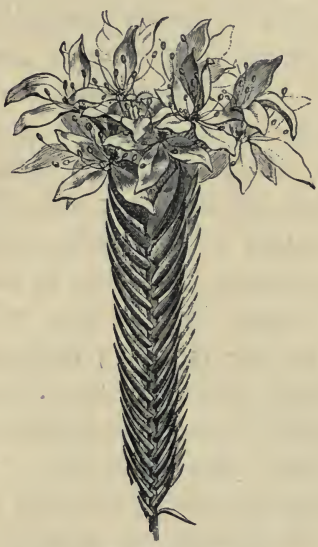

Fig. 74. Floriferous branch.

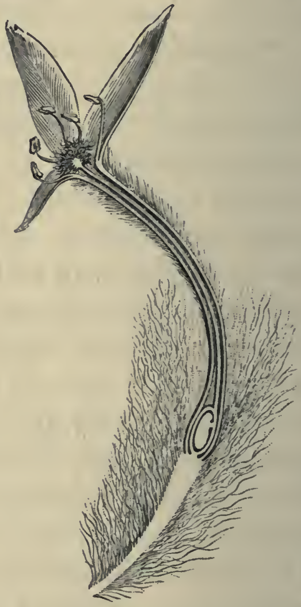

Fig. 76. Long. sect. of flower ($\frac{4}{1}$).

Lachnæa rosea.

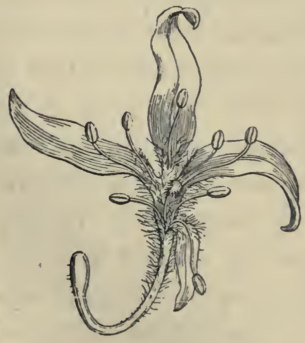

Fig. 75. Flower ($\frac{2}{1}$).

which alternate with the stamens are inserted lower down on the tube of the corolla (fig. 77); a character which has given a name (*Cryptadenia*) to one section of the genus. *Lachnœa* consists of ericoid ramose shrubs, with alternate or opposite leaves, and flowers terminal or solitary or collected in a variable number at the summit of the branches, in heads bare or surrounded by an involucre.

Lachnœa (Cryptadenia) grandiflora.

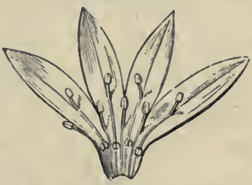

Fig. 77. Perianth and androœcium.

In the following types, while all the characters remain the same as the preceding, the scales of the throat of the perianth disappear. This is observed not only in *Daphne*, but in the numerous genera which, with it, here constitute a second subseries (*Eudaphneœ*). The most complete are those which, as *Dais* (fig. 78), have regular hermaphrodite pentamerous flowers, with two series of five stamens, of which five, longer and higher placed, are oppositipetalous, and a gynæcium surrounded by a hypogynous disk. *Dais*, shrubs of Madagascar and the Cape, has, besides, the foliage and inflorescence of *Gnidia*, to which it is often united, being distinguished only by the absence of scales from the throat. *Lasiadenia*, a shrub from Guyana and Venezuela, has nearly the same flowers; but the terminal and few-flowered capitules are destitute of an involucre, and the five glands which accompany the base of the ovary are short and covered with long hairs. It is scarcely possible to separate *Hargasseria*, shrubs of Cuba, except that the stamens are exserted instead of being enclosed, and the flowers are polygamous and collected in a capitule (without involucre) the receptacle of which is covered with abundant hairs (like that of *Lasiosiphon*). In *Goodallia*, a shrub of Guyana, which also has alternate leaves and flowers in terminal and capituliform spikes, the flowers are diœcious, pentamerous; and the hairy glands of the disk, ten in number, are not hypogynous, but inserted on the tube of the perianth, near the base; the form

Dais cotinifolia.

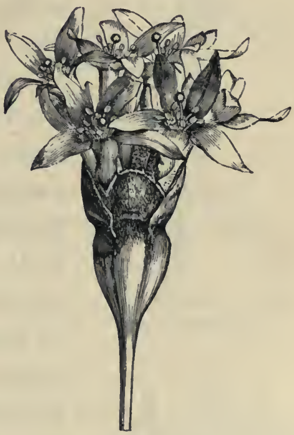

Fig. 78. Inflorescence.

is linear. *Daphnopsis*, shrubs of tropical America, has also diœcious flowers, with a bell- or funnel-shaped perianth; but they are tetramerous. The gynæcium is accompanied by a hypogynous disk, formed of four small glands independent or united in a short tube or cupule. The flowers are alternate, and the inflorescence is in umbels or pedunculate capitules, solitary or collected in cymes.

Lagetta, the Lac tree of the Antilles, has also tetramerous flowers; but they are hermaphrodite, and the coloured perianth is oval-oblong, narrowed at the throat, then divided into four imbricate lobes. The andrœcium is formed of two verticils of four enclosed stamens, nearly sessile, and the ovary, whose base is destitute of disk and its surface covered with long hairs, is surmounted by a short style, swollen at its stigmatiferous extremity. The fruit is dry, covered with hairs and surrounded by the persistent base of the calyx. It is a tree with large alternate and oval leaves, and flowers in simple and terminal spikes. *Funifera*, sometimes united with *Lagetta*, are Brazilian, and have alternate or opposite leaves, with flowers collected in racemiform or spiciform cymes, terminal or occupying the axils of the upper leaves. They are tetramerous, with eight enclosed stamens, but diœcious, and the base of the ovary is accompanied by eight long linear setaceous glands intermixed with long silky hairs. The fruit is also dry and surrounded by the accrescent and persistent perianth. *Peddiea*, shrubs of southern and tropical Africa, have alternate or nearly opposite leaves and hermaphrodite, umbellate, terminal flowers, with articulate pedicels. The perianth is cylindro-conical, with 4 or 5 imbricate lobes. The andrœcium consists of 8 or 10 enclosed stamens, inserted within the tube in two verticils, and the ovary is accompanied by a hypogynous disk in form of a denticulate cupule. The fruit is drupaceous and bare.

Dirca palustris.

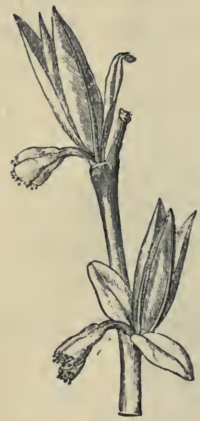

Fig. 79. Floriferous branch.

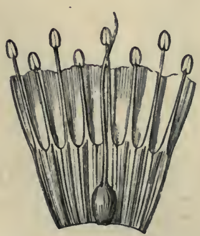

Fig. 80. Flower, perianth laid open ($\frac{3}{1}$).

Dirca palustris (fig. 79, 80), a shrub of North America, has also hermaphrodite and tetramerous flowers. The petaloid perianth has the form of a horn with an aperture cut obliquely, and the eight stamens, arranged in two verticils alternating with the teeth of the perianth, are inserted towards the lower part of the perianth and exserted. The ovary is accompanied by a small annular disk and surmounted by a style attenuated towards the summit. The fruit is a naked berry. The leaves are alternate, caducous, and the flowers, which blossom in early spring, are axillary and solitary or in few-flowered cymes.

Daphne (fig. 81–85) has also hermaphrodite and tetramerous flowers. The perianth, green or petaloid, has the form of a tube or funnel, and its limb consists of four folioles, disposed in the bud in imbricate-alternate prefloration. As in the preceding genera, the throat is destitute of scales, and the andrœcium is formed of eight stamens, sessile or nearly so, of which four superposed to the sepals are taller. The gynæcium is surrounded by a disk generally very short, and the ovary is surmounted by a style nearly apical, with dilated summit, spherical or ovoid, covered with stigmatic papillæ. In *Edgeworthia*, which has been generically distinguished, it is longer and claviform in its stigmatiferous portion. The fruit is a naked berry, with a pericarp sometimes thin; it contains one seed with albumen thin or nil. *Daphne* consists of shrubs from the

Daphne Mezereum.

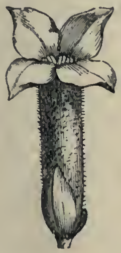

Fig. 82. Flower ($\frac{4}{1}$).

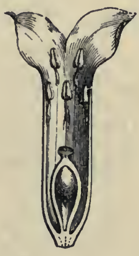

Fig. 83. Long. sect. of flower.

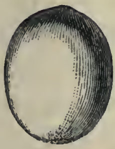

Fig. 84. Fruit ($\frac{3}{2}$).

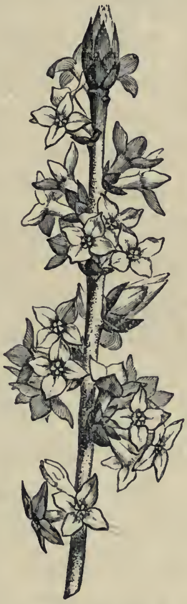

Fig. 81. Floriferous branch.

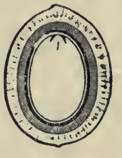

Fig. 85. Long. sect. of fruit.

temperate regions of Europe, Asia, or Africa, with alternate or rarely opposite leaves most frequently persistent. The flowers are sometimes axillary and sessile, generally in the axils of the upper leaves or bracts which take their place, so that collectively they form a sort of capitule. In the *Daphne* of South-western America, the habit and the foliage are the same; but the tetramerous flowers are declinous, and the perianth is infundibuliform, constricted at the throat. Of the eight stamens, reduced in the female flower to narrow sterile tongues, the four superior are oppositipetalous and exserted. The gynæcium is surrounded by a small disk of four scales, and the elongated style is dilated to a stigmatiferous head. They formed the genus *Ovidia*, abundant especially in the Andes. *Wikstrœmia* was also formerly comprised in the genus *Daphne*, and is scarcely distinct; the perianth and andrœcium are the same; the disk is nil or formed of four hypogynous, linear scales, free or united at the base. The fruit, generally but slightly fleshy, finally separates from the perianth, which opens lengthwise, and the seed has a scanty albumen. They are Oceanic and Asiatic trees and shrubs, with opposite, more rarely alternate leaves, not persistent, and terminal inflorescence.

Beside *Daphne* and *Wikstrœmia* are ranged some other closely allied genera, all of which have regular, diplostemonous flowers, without scales in the throat. Such are *Stellera*, shrubby or herbaceous plants of temperate Asia. The perianth is hypocrateriform, 4–6-merous, and its tube presents above the ovary a transverse articulation. The upper becomes detached, whilst the indurated base surrounds the dry fruit. The ovary, surrounded by an oblique membranous disk, is surmounted by a bundle of hairs from which emerges the style dilated at the summit. The leaves are alternate and the flowers disposed in spikes or in terminal capitules. *Thymelæa* has tetramerous, unisexual or hermaphrodite flowers, without hypogynous disk. They are shrubby or subshrubby plants of the Levant, Asia and North Africa. The leaves are alternate, and the flowers axillary, solitary or collected in glomerules. *Arthrosolen*, shrubs or undershrubs of southern and eastern Africa, having flowers axillary or terminal and surrounded by an involucre, has an infundibuliform coloured perianth; the flower differs from that of *Gnidia* only in the absence of scales in the throat of the perianth. *Diarthron* is also very analogous. The tetramerous perianth has the form of an elongate tube and presents a transverse articulation constricted above the ovary. The latter is surrounded by a thin annular disk, and becomes a dry fruit surrounded by the inferior portion of the perianth. *Diarthron* comprises slender herbs from central Asia; the leaves are alternate, linear, and the flowers form elongated and slender spikes, destitute of bracts. *Passerina* (fig. 86) has also tetramerous flowers, with hypocrateriform calyx; the ovary is without a disk, and the two staminal verticils are sufficiently near to appear a single verticil. The fruit is dry or more rarely fleshy, as in *P. empetroides*, of which has been made a genus *Chymococca*, but which, like its congeners, is a Cape plant, ericoid, tomentose, with linear opposite leaves, and flowers solitary or collected in short spikes or terminal capitules.

Passarina hirsuta.

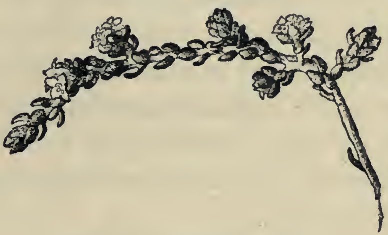

Fig. 86. Floriferous branch.

The andrœcium is rarely isostemonous in this series, and there are only four genera therefore constituting the subseries *Struthioleæ*. *Struthiola* and *Kelleria* have in fact only four stamens, alternate with the divisions of the perianth; but the throat of the latter bears four simple or unsheathed scales, superposed to the divisions (*Eustruthioleæ*). In *Drapetes*, on the contrary, the scales disappear (*Drapeteæ*), all the other characters remaining those of *Kelleria*. *Struthiola* consists of Cape shrubs or undershrubs, ericoid and with leaves almost always alternate. *Kelleria* and *Drapetes* are humble subshrubby and cæspitose, musciform plants, with sessile and imbricate leaves. The former are Oceanic; the latter inhabit the mainland and principal islands of the Magellanic

Pimelea ligustrina.

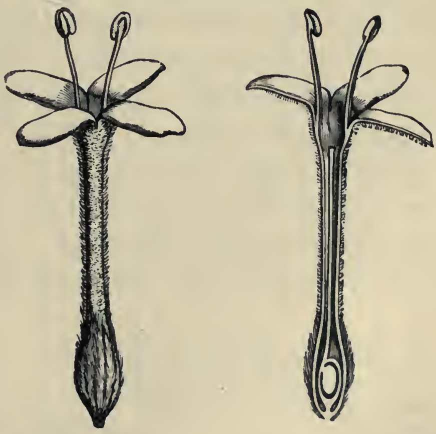

Fig. 87. Flower (4/1). Fig. 88. Long. sect. of flower.

region. *Schœnobiblus*, of which only one woody species from Brazil is known, has membranous alternate leaves, and male flowers disposed in terminal umbels. The perianth presents a short, infundibuliform tube, covered with hairs at the bottom, with four linear open lobes, to which are superposed an equal number of exserted stamens, with oblong and introrse anthers. The female flower is unknown. Still more rarely there are less stamens than parts in the perianth, and the small subseries (*Pimeleæ*) in which this is observed, comprises the single genus *Pimelea* (fig. 87, 88), which has only two stamens superposed to the most exterior of the four divisions of the perianth, and which includes shrubby, subshrubby or herbaceous plants, natives of Australia, Tasmania, New Zealand and, very rarely, of Java. In nearly all cases the leaves are opposite and the inflorescence capitate and terminal.

This very natural family is of very ancient origin. ADANSON[1] had very clearly indicated it in 1793, in section II of his Family of *Garou* (*Thymeleæ*[2]). A. L. DE JUSSIEU[3] gave to the same group the name of the order *Thymeleæ*, but he introduced into it wrongly *Quisqualis* (*Combretaceæ*). LINDLEY[4] and ENDLICHER[5] fairly limited this family for which C. A. MEYER proposed the name *Daphnaceæ*); but the former included *Exocarpus* (*Santalaceæ*[6]), and *Hernandieæ*, which we have referred to *Lauraceæ*;[6] and the latter retained *Cansjera* (of the *Santalaceæ*) and *Hernandiaceæ*; but he added, as a doubtful genus, however, *Phaleria* which JACK[7] had published some fifteen years previously. In fact ENDLICHER, in 1836, admitted fourteen of the genera now preserved, *Dirca*, *Daphne*, *Dais*, *Lachnæa*, *Passerina*, *Diarthron*, *Drapetes*, *Pimelea*, *Struthiola*, *Gnidia*, *Linostoma*, *Wikstrœmia*, *Lagetta* and *Phaleria*. MEISSNER, who at various times[8] occupied himself with this family, in 1857 added to it the genera *Ovidia* and *Lophostoma*, at the same time ascribing to it in their respective order the ancient genus *Thymelæa* of TOURNEFORT,

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[1] *Fam. des Pl.* ii. 278, Fam. 40.

[2] *Vepreculæ* L. *Phil. Bot.* (1751), 33.

[3] *Gen.* (1789), 76, Ord. 2.

[4] *Introd.* (ed. 2), 194; *Veg. Kingd.* (1846). 530, Ord. 203 (*Thymelaceæ*).

[5] *Gen.* 329, Ord. 109 (*Daphnoideæ*).

[6] See *Nat. Hist. of Plants*, ii. 449.

[7] *Mal. Misc.* (1820–22).

[8] *Linnæa*, xiv. 385; *Denkschr. Bot. Ges. Regensb.* iii. 274; *Gen.* 323, 330 (242); *Mart. Fl. Bras. Thymel.* (fasc. 14); *DC. Prodr.* xiv. 493 (1857).

Stellera of Gmelin, *Arthrosolen* and *Funifera* of C. A. Meyer, *Kelleria* of Endlicher, *Peddiea* of Harvey, *Daphnopsis* and *Schœnobiblus* of Martius and Zuccarini, *Dicranolepis* of Planchon, *Coleophora* of Miers and *Goodallia* and *Lasiadenia* of Bentham. In fact, he admitted among the *Thymeleæ* thirty-three genera which we have reduced to twenty-seven and to which Oliver[1] has just added *Synaptolepis.* We have also proposed, in this series, a new genus *Stephanodaphne*;[2] bringing the total up to twenty-nine. The *Aquilarieæ*, which formerly comprised only the genera *Aquilaria* of Lamarck[3] and *Gyrinops* of Gærtner,[4] have been long separated from the *Thymelaceæ*, chiefly on account of their pluricarpellar gynæcium; but R. Brown, who ranged them beside the *Dichapetaleæ* (*Chailletieæ*), declares, however,[5] "that their affinity with the *Thymeleæ* would be less difficult to establish than with any other group." This opinion, the 'paradoxical appearance' of which he did not dissimulate, is indeed now adopted by everyone. We have seen Endlicher placing *Phalaria* in the series of the *Thymelaceæ*; which entails the annexation to this family of *Aquilaria* and *Gyrinops*, inseparable from *Phaleria.* Unfortunately, Decaisne, engaged with these plants in 1843[6] and 1864,[7] placed before the latter generic name that of *Drymispermum*,[8] which is posterior to it, and, inconsiderately multiplying generic and specific divisions, introduced the utmost confusion, making with the true *Phaleria* at the same time *Drymispermum*, *Pseudais* and *Leucosmia*, persisting in and even aggravating his errors in his work of 1864, in which he appears to take no notice of the progress of science or the labours of his predecessors.[9] Meissner,[10] also, having passively admitted the valueless genera established by Decaisne, was led to divide the *Aquilarieæ*, under the same title as the *Thymeleæ*, into two tribes, *Gyrinopeæ* and *Drymispermeæ*, distinguished from each other by the presence or absence of scales in the throat of the perianth, and to place the same genus, under different names, in both tribes. Happily in

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[1] *Hook. Icon.* t. 1074 (1870).

[2] *Adansonia*, xi. fasc. 10 (1875).

[3] *Dict.* ii (1806).

[4] *Fruct.* ii (1791).

[5] *Congo* (1818), 443; *Misc. Works* (edit. Benn.), i. 126.

[6] *Ann. Sc. Nat.* sér. 2, xix. 35, t. 1.

[7] *Voy. Vénus*, *Bot.* 13, tab.

[8] Reinw. *Syllog. Pl. Ratisb.* 15 (1828).

[9] For the most complete demonstration of these facts, now scarcely credible, see *Adansonia*, xi. fasc. 10.

[10] *Prodr.* xiv. 601 (1857).

1866, Seemann[1] had the credit of restoring in one and the same genus *Phaleria* (*Drymispermum*) and *Leucosmia* of BENTHAM;[2] a union fully adopted by this conscientious observer.[3] MIQUEL long since, in 1861 and in 1863, enriched this series with the genera *Skaphium*,[4] *Lachnolepis*[5] and *Gonistylus*,[6] the two former of doubtful position, and the last intermediate, in the form and dimensions of the floral receptacle, between the *Aquilarieæ* formerly known and the genus *Octolepis* proposed some years since by OLIVER.[7]

The thirty-three genera whose autonomy we admit comprise about two hundred and sixty species. Not two are common to both worlds, and a dozen of them are American. The greater part are monotypes and their total represent only some thirty odd species, whilst about two hundred and fifty are peculiar to the old world, and are distributed in twenty-one genera. None of the *Aquilarieæ* (some score of species grouped in half-a-dozen genera) belong to America, and all, except *Octolepis* which is African, are natives of the warmest parts of south-eastern Asia and tropical Oceania. The American *Thymeleæ* are nearly all from South America. Only a couple of *Daphnopsis* and *Dirca* are from North America. The three genera *Daphnopsis*, *Lagetta* and *Hargasseria*, are found in the Antilles, and the two latter are met with nowhere else. *Coleophora*, *Funifera*, *Lophostoma* and *Schœnobiblus* have been observed only in Brazil; *Lasiadenia* in the north of Brazil and in Venezuela; *Goodallia* in Guyana; *Ovidia* in the Columbian Andes and Chili; *Drapetes* in the Magellanic region. Among those that belong to the old world there are genera, not rich in species, the geographical distribution of which is quite as limited. Thus *Peddiea* is exclusively from Southern or Western Africa; *Dicranolepis*, from tropical Western Africa; *Synaptolepis*, from Zanzibar; *Stephanodaphne*, from the eastern isles of Africa; *Passerina* and *Arthrosolen*, from southern Africa; *Darthron*, from central Asia; *Dais*, from Madagascar and the Cape; *Kelleria*, from Oceania; *Linostoma*, from

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[1] *Fl. Vit.* 207.

[2] *Hook. Lond. Journ.* ii. 231.

[3] *Fl. Austral.* vi. 37.

[4] *Fl. Ind.-Bat.* Suppl. i. 357.

[5] *Ann. Mus. Lugd.-Bat.* i. 134.

[6] *Ann. Mus. Lugd.-Bat. loc. cit.* t. 4.

[7] *Journ. Linn. Soc.* viii (1865).

India. The greater part of the Oceanic *Thymeleæ* are *Pimeleas*, to the number of nearly a hundred. To the Cape belong exclusively two genera of numerous species, *Struthiola* and *Lachnæa*. The genera most widely spread in the old world are: *Gnida*, which grows in Africa, in Asia and as far as tropical Oceania; *Wikstrœmia*, which is Asiatic and Oceanic; *Thymelæa*, extending like *Daphne*, through Asia, Africa and Europe. In America, from Tierra del Fuego, where *Drapetes muscosa* grows, to Canada, where *Dirca palustris* is found, there are a hundred degrees. In our hemisphere, from Tasmania and New Zealand, where the *Kellerias* are the analogues of *Drapetes*, to Sweden and Norway, where also *Daphne* grows, there is the same distance. The latter genus has representatives in Java, in China and Japan, in India, in Siberia and in all the countries of Europe.

All these plants have pretty numerous constant characters. The principal are: the simplicity of the perianth[1] and its imbricate prefloration; the definite number of parts of the andrœcium and their insertion on the floral envelope; the independence of the gynæcium and its insertion inferior to that of the stamens.[2] The characters which vary most and which generally serve to mark the generic divisions are: the number of the parts of the flower, the point of insertion of the stamens and the dimensions of their filaments which render them exserted or enclosed, the presence or absence of scales in the throat of the perianth and of glands forming a disk at the foot of the gynæcium, the consistence of the pericarp, the mode in which the base of the perianth falls after floration or persists growing round the ripe fruit, the relative proportions of the embryo and albumen which may be wanting, and the arrangement of the inflorescence. A single character distinguishes the series of the AQUILARIEÆ from that of the THYMELEÆ; it is the number of the carpels of which the gynæcium is formed; one in the latter and two in the former. And even this character is not absolute. It is indeed exceptional that one cell and one ovule is observed in the *Thymeleæ*;[1] but in certain species of *Phaleria*, a genus of *Aquilarieæ*, there is nearly as often one ovarian cell and one ovule as two.[2]

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[1] The comparative study of types such as *Octolepis*, *Aquilaria* and *Daphne*, for example, without speaking of the intermediaries, seems to prove that the part considered as the tube of the calyx here represents a receptacle, bearing perigynous stamens, the true calyx consisting only of the parts of the limb. PAYER (*Organog.* 481) arrived at the same conclusion, *Adansonia*, xi. fasc. 10.

[2] There are other characters nearly constant in the organs of vegetation. In this respect must be mentioned the simplicity of the leaves, the absence of stipules, and, in the organisation of the stems, the peculiarities traceable in the liber, tenaceous, sometimes textile, with the remarkable fascicular structure which renders the leaflets reticulate, in form of cloth, lace, thread, and which prevents the branches of the *Thymeleæ* from being easily and cleanly broken. (See LINK, *Anat. Pl.* (1843), t. viii. 6.—A. JUSS. *Elém. Bot.* 65, fig. 96.—OLIV. *Stem. Dicot.* 31.)

This last character shows us plainly enough that, if the affinities of this family with the *Lauraceæ*, *Hernandieæ*, *Protaceæ* were alone perceived by early botanists, it is because they had to compare with them scarcely any but the *Thymeleæ*—that is, types with unicarpellar gynæcium and parietal placentation;[3] but we must now inquire to what families the *Thymelaceæ* ally themselves by their highest types, those whose gynæcium is formed of more than one leaf and contains two cells, complete or incomplete. These are the *Penœaceæ*, the *Rhamnaceæ* (especially the *Colletieæ*) and the *Celastraceæ*. The 'tube' of the flower, we have repeatedly said, appears to have the same morphological signification in the *Thymelaceæ* and in the plants of these families which have a perigynous andrœcium. But in the *Rhamnaceæ* and in those of the *Penœaceæ* which have in each cell only two ovules, the latter are always ascending. Moreover, the *Rhamnaceæ* are distinguished by their oppositipetalous stamens, and the *Penœaceæ*, by the quite special organization[4] of their ovarian partition. The *Celastraceæ* are generally hypogynous; and, in this case, they nearly approach, by their entire floral organization, one of the *Thymelaceæ* scarcely perigynous, such as *Octolepis*. But in those of the *Celastraceæ* whose ovules are descending, as is invariably the case in the *Thymelaceæ*, the mycropyle, exterior in the latter, is turned upwards and inwards. It would always be difficult, as we have elsewhere pointed out,[1] not to find a striking resemblance between *Octolepis*[2] and *Geissoloma.*

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[1] *Peddiea* has been cited as sometimes having two ovules in one and the same cell, and DE MARTIUS has seen two or three ovules and as many stones in *Funifera utilis*.

[2] H. BN. *Adansonia*, xi. fasc. 10. The gynæcium of *Aquilaria* is sometimes tricarpellar.

[3] The *Lauraceæ* are everywhere distinguished from the *Thymeleæ*: 1. by the perianth formed of two or more verticils; 2. by the character, quite peculiar, of their valvicide anthers; 3. by the position of the micropyle, which, in the descending ovule, is interposed between the hilum and the placenta. The *Hernandiœæ* are *Lauraceæ*, and have besides, as we have seen (*vol. ii.* 449), a double perianth, free stamens and an inferior (adherent) ovary, surmounted by an epigynous disk. It is difficult in the present day to understand the opinion of authors who placed them among or after the *Thymeleæ*, perhaps on account of their induviate fruit. The *Proteaceæ* frequently have one ovule like the *Thymeleæ;* it is then either orthotropous and descending, or anatropous and ascending; which is never seen in the latter. The stamens, always the same in number as the divisions of the perianth in the *Proteaceæ*, are superposed to those divisions, whilst in the isostemonous *Thymelaceæ* (except in *Schænobiblus*, a genus still imperfectly known) the stamens alternate with the sepals, and, when they are opposite, as in *Pimelea*, they are fewer.

[4] See p. 96, fig. 60–63.

Uses.[3]—The *Thymeleæ* are acrid plants, often very dangerous, most parts, when introduced into the intestinal canal, producing a violent, sometimes mortal, irritation; in the mouth and throat, a burning sensation, followed by a change in the mucous membrane analogous to that produced on the skin, and which is true blistering if the contact is sufficiently prolonged. This property has been attributed to *daphnine*,[4] a principle often found in *Daphne* united with a green oil, which can be analysed into glucose and *daphnetine*. Many European *Daphnes* are employed as *vesicants*, chiefly *Garou*, *D. laureola* and *Bois-gentil* (*D. Mezereum*). The bark and more rarely the seeds are used in medicine. *Garou* (or *Sain-Bois*[5]) is a small shrub from the south of Europe. Its bark,flexible and difficult to break, has a tenacious liber which might be textile if freed from the fine white silk which covers the exterior, and which, entering the skin, produces a painful itching. It is acrid, nauseous, corrosive, and is used especially in preparing blistering powders and ointments. The fresh bark itself has also been employed, in southern districts, to establish revulsion and issue. It is an active but dangerous emmenagogue, and also a powerful moderator of cutaneous affections. *Bois-gentil*[6] (fig. 81–85) has quite the same properties, but is less used among us, except in rural districts. In Germany, the bark of the stems and of the roots is used as a vesicant. The taste, at first sweetish, speedily becomes extremely acrid. It produces vomiting, active purgation and inflammation of the urinary passages. *Bois-gentil* has been employed in the treatment of chronic cutaneous affections, paralysis of the organs of deglutition, and locally against dental decay. The workmen who pulverise this bark and that of *Garou* find much difficulty in protecting their eyes and respiratory passages from the penetration of this irritant powder. Persons who have taken this bark internally are often affected by a perspiration in the head and neck, after which remains a burning sensation in the throat. *Laureola*,[1] and *Daphne collina*,[2] *alpina*,[3] *pontica*,[4] *altaica*,[5] *Cneorum*,[6] *oleoides*,[7] *Bholua*,[8] have, in various degrees, similar properties. The same is said of *Dirca palustris*[9] (fig. 79–80), employed as a purgative by the North Americans, of *Lagetta lintearia*, of *Wikstrœmia indica*,[10] of *Daphnopsis Swartzii*[11] and *tinifolia*,[12] of *Thymelœa Tartonraira*,[13] and of many species of *Gnidia*.[14] The action of the fruits and seeds is similar, though generally less marked. The pericarp of *Bois-gentil* is said to be poisonous for all animals except birds, which among us feed upon it. The seeds of *Garou* were formerly used in the South as a purgative, under the name of *Grana gnidia* or *Cocca gnida*, whence is supposed to be derived the vulgar name *Coquenaudier*. Its leaves, as also those of *Laureola* and *Mezereum*, are also employed in decoction and in powder in rural districts; they purge in a less violent manner. *Daphne* contains likewise a colouring matter. *Garou* is used in the south to dye wool yellow. A beautiful yellow lac is also extracted from *D. alpina* and *Laureola. Passerina tinctoria* also furnishes a dye of the same colour.[1] As plants with a textile liber, the *Thymeleæ* still play a certain part in practice. In Madagascar, cord and paper are made from the bark of *Gnidia daphnæfolia*,[2] and paper from that of *G. madagascariensis*.[3] *Daphne Bholua* and *papyracea*[4] in India, and *D. cannabina* and *chrysantha*[5] in China and Japan serve the same purpose. *Hargasseria Lagetta*[6] and *Lagetta calenzuana*[7] in Cuba have a reticulated tenaceous whitish liber resembling certain loose tissues; but the most beautiful and best known of these lace-woods is the liber of *Lagetta lintearia*,[8] which, prepared by maceration and compression, imitates net somewhat irregularly. Of it are made cuffs, collars and cockades resembling lace, fine mats, and whips used to chastise the negro slaves. In many of the Polynesian Isles, notably in the Sandwich, the clothes of the natives have for a long time consisted of the liber of *Thymeleæ*, chiefly of *Wikstrœmia indica*, separated into leaves beaten and compressed with special implements, then smoothed and painted, fairly imitating coarse lace. In Brazil *Funifera utilis*[9] is used to make mats and cordage.

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[1] *Adansonia*, xi. 290, etc.

[2] Oliver compares these with *Penæa*.

[3] Endl. *Enchirid.* 209.—Lindl. *Fl. Med.* 324; *Veg. Kingd.* 531.—Guib. *Drog. Simpl.* éd. 6, ii. 384.—Rosenth. *Syn. Pl. Diaphor.* 240, 1133.

[4] $C^{64}H^{42}O^{46}$. Sweng. *Ann. Chem. und Pharm.* cxv. 1.—Gueilliot, *Etude sur les Daphne.* —(Thès. École . . . Pharm. Par. 1867.

[5] *Daphne Gnidium* L. *Spec.* 357.—Duham. *Arbr.* ii. t. 23.—Sibth. et Sm. *Fl. Græc*, t. 356. —Mér. et Del. *Dict. Mat. Méd.* ii. 580.—Hayne, *Arzn. Gew.* iii. t. 45.—Reichb. *Ic. Fl. Germ.* t. 553.—Guib. *op. cit.* ii, 384, fig. 471.—Gren. et Godr. *Fl. de Fr.* iii. 60.—Caz. *Méd. Indig.* éd. 3, 365.—Rev. *Fl. Méd. du* XIXe *Siècle*, ii. 75.—Rosenth. *op. cit.* 240.—*D. Cnidium* Boiss. *Voy. Esp.* ii. 557.—*D. Paniculata* Lamk. *Fl. Fr.* iii. 222.—*Thymelæa Gnidium* All. *Fl. Pedem.* i. 153 (*Lin sauvage* ou *bâtard*, *Trintanelle*, *Thymélée de Montpellier*, *Camélée noire*, *Bois d'oreilles*).

[6] *D. Mezereum* L. Spec. 356.—Blackw. *Herb.* t. 582.—Nees, *Ic. Fl. Germ.* iii. t. 46.—Reichb. *Ic. Fl. Germ.* t. 556.—Hayne, *Arzn. Gew.* iii. t. 43.— Mér. et Del. *Dict. Mat. Méd.* ii. 584.—Guib. *loc. cit.* 385.—Gren. et Godr. *Fl. de Fr.* iii. 57.—Rosenth. *op. cit.* 240. —Berg. et Schm. *Darst. Off. Gew.* t. 12 b.—*D. Liotardi* Vill. *Dauph.* iii. 516.—*Mezereum officinarum* C. A. Mey. *Beitr.* v. n. 112.—*Thymelæa Mezereum* Scop. *Fl. Carniol.* 279.—All. *Fl. Pedem.* 131 (*Joli-bois*, *Faux-Garou*, *Lauréole femelle* ou *gentille.*).

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[1] *D. Laureola* L. *Spec.* 356.—BLACKW. *Herb.* t. 62.—JACQ. *Fl. Austr.* ii. 49, t. 183.—MÉR. et DEL. *Dict. Mat. Méd.* ii. 584.—HAYNE, *Arz. Gew.* iii. t. 44.—GUIB. *op. cit.* ii. 386.—GREN. et GODR. *Fl. de Fr.* iii. 57.—CAZ. *Pl. Méd. Ind.* éd. 3, 366.—REV. in *Fl. Méd. du* XIXe *Siècle*, i. 449.—ROSENTH. *op. cit.* 240.—*D. major* LAMK. *Fl. Fr.* iii. 221.—*Thymelæa Laureola* SCOP. *Fl. Carniol.* i. 276 (*Laurier-Epurge, L. des Bois, Auriole, Lauréole Mâle*).

[2] SM. *Spicil.* ii. t. 18.—MEISSN. *Prodr.* xiv. 535, n. 15.—*Bot. Mag.* t. 428.

[3] L. *Spec.* 356.—*D. candida* WITTM.—*Thymelæa candida* SCOP. *Fl. Carn.* ed. 2, i. 277.

[4] L. *Spec.* 357.—ANDR. *Bot. Repos.* t. 73.—*Bot. Mag.* t. 1282. We are assured that the poisonous honey of Asia Minor is collected partly from this plant.

[5] PALL. *Fl. Ross.* i. 53, t. 35.—LODD. *Bot. Cab.* t. 399.—*Bot. Mag.* t. 1875.

[6] L. *Spec.* 357.—JACQ. *Fl. Austr.* v. 12, t. 426.—CURT. *in Bot. Mag.* t. 313.—BULL. *Herb.* t. 121.—MÉR. et DEL. *loc. cit.* 580.—*D. odorata* LAMK. *Fl. Fr.* iii. 222.—*D. Verloti* GREN. et GODR. *Fl. de Fr.* iii. 59 (*D. Fausse-Chamélée*).

[7] SCHREB. *Dec.* i. 13, t. 7.—*D. caucasica* BIEB ?—*D. Jasminea* SIBTH. et SM. *Fl. Græc.* t. 358.

[8] DON, *Prodr. Fl. Nepal.* 68 (*Bholu Swa*). *D. Genkwa* (SIEB. et ZUCC. *Fl. Jap.* i. 137, t. 75) is also used for blistering in Japan; the bark is used. The flowers are administered internally as febrifuge, hydragogue and vermicide.

[9] See p. 130, note 9. BIGEL. *Med. Bot.* ii. t. 37.—LINDL. *Fl. Med.* 325.—ROSENTH. *op. cit.* 240 (*Bois de cuir, B. de plomb*).

[10] C. A. MEY. *Bull. Pétersb.* iv. n. 4.—MEISSN. *Prodr.* 543, n. 1.—*W. Forsteri* DCNE. in *Jacquem. Voy. Bot.* 146.—*W. nutans* BENTH. *Hook. Journ.* (1853), 195.—*Daphne indica* L. *Spec.* 511.—*D. fœtida* L. F. *Suppl.* 223.—FORST. *Prodr.* n. 168.—*Capura Purpurata* L. *Mantiss.* 225 (*Ooo, Oao, Avan-o-ao* in the Sandwich Isles).

[11] MEISSN. *Prodr.* 522, n. 9.—*Daphne occidentalis* SW. *Prodr.* 63.

[12] MEISSN. *Prodr. n.* 14.—*Daphne tinifolia* SW. *Prodr.* 63.—*Nordmannia tinifolia* FISCH. et MEY. (*Mahot*).

[13] ALL. *Fl. Pedem.* i. 133.—MEISSN. *Prodr.* 556, n. 16.—*Daphne Tartonraira* L. *Spec.* 356. —DC. *Fl. Fr.* iii. 357.—MÉR. et DEL. *Dict. Mat. Méd.* ii. 587.—*D. Candicans* LAMK.—*Passerina Tartonraira* SCHRAD. *N. Journ.* iv. p. i. 89.—GREN et GODR. *Fl. de Fr.* i. 63.—*Chlamydanthus Tartonraira* C. A. MEY.—*Sanamunda argentea latifolia angustifolia* BARREL (*Trintanelle, T. Malherbe, Gros-Retombet*).

[14] Notably *G. pinifolia* L. *simplex* L. and *imberbis* DRYAND. species from the Cape. *G. odorifera* LOUR. from Cochin China, yields a kind of tar which serves to calk ships.

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[1] *P. Filiformis* L. *hirsuta* L. *ciliata* L. and *villosa* L. are cited as evacuants, as also *Stellera Chamæjasme* L.

[2] L. F. *Suppl.* 225.—*Lasiosiphon pubescens* Dcne.—Meissn. *Prodr.* 597, n. 16.

[3] *Dais Madagascariensis* Lamk. *Dict.* ii. 254, *Ill.* t. 368, fig. 2.

[4] Wall. ex Steud. *Nomencl.* 483.

[5] *D. Papyrifera* Sieb. *Act. Bat.* xii. 24.—*Edgeworthia Chrysantha* Lindl. *Journ. Hort. Soc.* i. 148; *Bot. Reg.* (1847), t. 48.—*E. Papyrifera* Zucc. in *Abh. Baier. Akad.* iv. 199 (*Mitsmata* of the Japanese).

[6] *Linodendron Lagetta* Griseb.

[7] A. Rich. *Cub.* xi. 193.

[8] Lamk. *Dict.* iii. 376, 440; Suppl. iii. 236; *Ill.* t. 289.—Mér. et Del. *Dict. Mat. Méd.* iv. 19.—Lindl. *Fl. Méd.* 325.—Hook. *Kew Gard. Misc.* ii. t. 4; *Bot. Mag.* t. 4502.—Lindl. *Paxt. Fl. Gard.* i. n. 60, c. ic.—Lem. *Jard. Fleur.* t. 19.—Meissn. *Prodr.* 526.—Endl. *Enchirid.* 209.—Rosenth. *op. cit.* 242.—*Lagetto* Lunan, *Jam.* i. 473.—*Daphne Lagetto* Sw. *Prodr.* 63; *Fl. Ind. Occ.* i. 680 (*Lace-bark, Gauze-tree*).

[9] Leandro, MSS. C. A. Mey. *Bull. Acad. Pétersb.* iv. n. 5.—Meissn. *Mart. Fl. Bras. Thymel.* 67; *Prodr.* 525, n. 1.—*Daphne Brasiliensis* Raddi.—*D. Thereminii* Lhotzk.—*Lagetta funifera* Mart. et Zucc. *Nov. Gen. et Spec.* i. 66, t. 34 (*Embira branca*).

The *Aquilarieæ* present few useful species. The name comes, as is known, from that of Eaglewood or Aloes of which the genus *Aquilaria* furnished many commercial sorts. Among the odorous and resinous woods, formerly burnt in temples and palaces, and which in ancient therapeutics entered into a number of preparations, the best known, which GUIBOURT calls the ordinary Aloes wood of commerce, is probably the *Garo* of RUMPHIUS, the product of *Aquilaria malacensis*[1] (fig. 67–69) or *secundaria*;[2] and the same author thinks that it is *A. Agallocha*[3] of India which produces the Eaglewood or false Calambac.[4] The Orientals highly esteem these Aloes woods which their sacred books extol as aromatic and of which many articles of cabinet work, chaplets and trinkets are made. The *Agallochum spurium* of RUMPHIUS[5] is *Gonistylus bancanus.*[6]

The flowers of the *Thymelaceæ* are often very odorous. Those of *D. odora*, *japonica* and *Mezereum* have a sweet and strong perfume perhaps not sufficiently utilised. The industrial uses of the stems are not numerous in Europe. In Switzerland, satin-like hats are twisted from the wood of *Garou* and *Bois-gentil*, split into thin layers. In Greece, brooms are made of the branches of *Tartonraira.* *Dirca palustris* has a supple and flexible wood; its bark is used to make baskets and cordage. The precocious flowers of certain species, notably those of *Daphne Mezereum*, show themselves in the middle of winter. Many Chinese and Japanese *Daphnes* flourish at the same season in our cool conservatories, where are cultivated a great number of *Passerina*, *Gnidia*, *Dais* and the very beautiful Australian *Pimelea.*

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[1] LAMK. *Dict.* i. 49; *Ill.* t. 356.—DC. *Prodr.* ii. 59.—TURP. *Dict. Sc. Nat.* Atl. t. 248.—MEISSN. *Prodr.* 602, n. 3 (not BENTH.).—*A. Ovata* CAV. *Diss.* vii. 377, t. 224.—MIQ. *Fl Ind.-Bat.* i. p i. 882; Suppl. i. 141.

[2] DC. *Prodr.* ii. 59.—MEISSN. *Prodr.* 601, n. 2.—*Agallochum secundarium* RUMPH. *Herb. Amboin.* ii. 34, t. 10 (var. ? of the preceding species).

[3] ROXB. *Cat. Hort. Calc.* 33; *Fl. Ind.* ii. 422.—ROYLE, *Ill.* 173, t. 36, fig. 1.—BOXB. et COLEBR. *Trans. Linn. Soc.* xxi. 199, t. 21.—MEISSN. *Prodr.* 601, n. 1.—H. BN. *Dict. Encycl. Sc. Méd.* v. 754 (*Lignum verum Agallochum*, s. *Agalugin*, s. *Calambac*, s. *Aggur*, s. *Aloes*).

[4] GUIB. *op. cit.* éd. 6, iii. 337.

[5] *Herb, Amboin.* ii. 402.

[6] See p. 125, note 1.

GENERA.

I. AQUILARIEÆ.

1. **Aquilaria** Lamk.—Flowers hermaphrodite regular; more or less long obconical. Sepals 5, or, more rarely 6, inserted in the throat, imbricate. Stamens 10 (or rarely 12), inserted in two series with the sepals, perigynous; filaments short or very short, sometimes longer subexserted or exserted; anthers basifixed, ovate or oblong, introrse, 2-rimose. Squamules equal in number to, and inserted alternately with the stamens, erect exserted pilose. Germen sessile to bottom of tube, free, enclosed, 2- or more rarely 3-merous; style short or subnil, sometimes longer than and rising above the stamens, at apex dilated stigmatose more or less lobate; cells in germen 2, 3, more or less complete, sometimes very incomplete, 1-locular; ovule in cells 1, descending; micropyle extrorsely superior. Fruit drupaceous, finally capsular, girt at attenuate base with persistent calyx, obovate or oblong or obcordate, loculicidally 2, 3-valved; valves medially septiferous. Seeds 1–3, oftener 2; chalaza produced to a more or less spongy pilose cone; cotyledons of exalbuminous embryo fleshy plano-convex; radicle short inferior.—Trees; leaves alternate shortly petiolate exstipulate entire penninerved; nerves close parallel; flowers terminal, lateral or axillary subumbellate. (*Trop. south-east. Asia*, *Malaya*, *Borneo.*) See p. 102.

2. **Gyrinops** Gærtn.—Flowers nearly of *Aquilaria*; calyx slender and long tubular, externally puberulous; limb imbricate. Stamens 5, oppositipetalous, inserted, with as many plane setulose squamules, in the throat; anthers subsessile enclosed linear, introrsely 2-rimose. Germen inserted at bottom of perianth somewhat thickened and there furnished with unequal scarcely perceptible glands, long stipitate, attenuate at base and apex; style slender

erect, at apex stigmatose capitellate. Ovules in cells (2) solitary (of *Aquilaria*). Fruit, seeds and other characters of *Aquilaria*; pericarp ovato-oblong or subovate.—A shrub; leaves alternate (of *Aquilaria*); flowers axillary and subterminal subumbellate, very shortly pedicellate. (*Ceylon.*) See p. 104.

3. **Phaleria** Jack.—Flowers hermaphrodite, 4–5-merous; receptacle long tubular (petaloid); sepals inserted in throat, imbricate. Disk very thin lining the tube, thickened above at the throat and there annular, subentire or 5-crenate, sometimes produced to 4, 5 scales alternating with the sepals and more or less prominent and thick. Stamens 8–10, inserted in two series under the throat; the oppositipetalous longer; filaments either very short enclosed, or more or less elongate and exserted; anthers basifixed introrse, 2-rimose; all exserted or enclosed, or the oppositisepalous semi-exserted. Germen subsessile, sometimes shortly attenuate at base and there girt with hypogynous membranous disk, equal or unequal, subentire or lobate; cells 1, 2, 1-ovulate; style terminal or lateral, or short enclosed, or elongate exserted, at apex stigmatose capitate subentire or more or less 2-lobed. Ovules in cells 1, descending; micropyle extrorsely, superior. Fruit bare drupaceous, indehiscent; sarcocarp oftener thin; putamen woody, 1–2-locular, 1–2-spermous; embryo of exalbuminous descending seed fleshy; cotyledons thick plano-convex; radicle short superior.—Glabrous trees or shrubs; leaves oftener opposite and shortly petiolate exstipulate entire coriaceous penninerved; flowers in short or umbelliform spikes terminal or lateral; bracts imbricate forming involucre around flowers, caducous. (*Southeast. Asia and north. trop. Oceania.*) See p. 104.

4. ? **Gonistylus** Teysm. and Binn.[1]—"Flowers hermaphrodite; calyx short subsemiglobular[2] coriaceous, deeply 5-lobed; lobes subvalvate, persistent. Scales numerous (35), inserted in one series in the throat, filiform. Stamens 10; filaments short, incurved in æstivation; anthers oblong obtuse; cells 2, confluent above, longitudinally rimose. Germen subglobular, 4–5-celled; ovules in cells solitary pendulous anatropous; style filiform very slender geniculately bent, apex small clavate 2-lobed stigmatose. Berry[3] subglobular;

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[1] *Bot. Zeit.* (1862), xx. 265.—Miq. *Ann. Mus. Lugd.-Bat.* i. 184, t. 4.—H. Bn. *Adansonia*, xi. fasc. 10.

[2] Very like a cupular receptacle; sepals somewhat perigynous free (?)

[3] "Pomi majoris mole, aurantiaca."

mesocarp fibrous; cells 4, 5; seeds affixed to vertex of central columella, oblong curved; embryo exalbuminous.—A lofty tree; leaves alternate petiolate sublanceolate entire coriaceous penninerved reticulate-veined, persistent; racemes terminating axillary few-flowered twigs; flowers fasciculate in dense hirsute tubercle. (*Banca*, *Java*, *Sumatra*.[1])"

5. **Octolepis** Oliv.[2]—Flowers hermaphrodite; receptacle flat subcupular. Sepals 4, subperigynous, imbricate. Stamens 8, inserted in two series with the perianth; filaments free subulate; anthers ovate or ovately-cordate introrse; cells 2, longitudinally rimose. Squamules 8, inserted and alternating with the stamens, entire obtuse, pilose, valvate in the bud. Germen sessile ovoid hirsute, 4-celled; style terminal short, at apex stigmatose dilated openly 4-lobed; ovule in cells 1, descending from top of internal angle. Fruit...?—"A small tree; leaves alternate petiolate obovate-lanceolate apiculate, entire or widely denticulate membranous; flowers[3] axillary fasciculate few pedicellate." (*Trop. west. Africa*.[4])

II. THYMELEÆ.

6. **Linostoma** Wall.—Flowers hermaphrodite apetalous regular; perianth tube (receptacle ?) obconical (coloured), deciduous; lobes 5, equal, imbricate, finally patulous. Stamens 10, inserted in throat, in 2-series, 5 oppositipetalous, a little longer; filaments free exserted subulate; anthers oblong introrse obtuse, 2-rimose. Squamules 10, inserted in throat alternately with stamens, oblong-linear, attenuate at base, at apex subentire, obtuse or more or less incised, finally erect and exserted. Germen sessile in bottom of tube, girt at base by 10 minute hypogynous glandules opposite the stamens, ovoid hirsute 1-locular; style terminal slender exserted, at apex stigmatose capitate; ovule 1, parietally inserted, descending, anatropous; micropyle extrorsely superior. Fruit dry ("drupaceous") bare, indehiscent; albumen of descending seed but slightly fleshy; radicle of somewhat thickened embryo superior.—Shrubs sometimes subscandent; leaves opposite entire penninerved exstipulate; floral

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[1] Spec. 1. *G. bancanus.* — *G. Miquelianus* Teysm. et Binn. *loc. cit.*—*Aquilaria ? bancana* Miq. *Fl. Ind.-Bat.* Suppl. i. 355.—*A. macrophylla* Miq. *loc. cit.* — *Agallochum spurium* Rumph. *Herb. Amboin.* ii. 402.

[2] *Journ. Linn. Soc.* viii. 161, t. 12.

[3] "White," small.

[4] Spec. 1. *O. Casearia* Oliv. *loc. cit.*

leaves submembranous diversiform; flowers in terminal umbels (?). (*India*). See p. 105.

7. **Lophostoma** Meissn.[1]—Flowers nearly of *Linostoma*; calyx tubular, marcescent, persistent round fruit large membranous. Squamules 10, inserted in throat with as many longer stamens. Hypogynous disk 0. Fruit dry enclosed by calyx and basally seated in receptacle thickened to a ring, acuminate; pericarp smooth crustaceous, indehiscent. Seed . . . ? Other characters of *Linostoma.*—Small trees or shrubs; leaves opposite or subopposite (of *Linostoma*); flowers in terminal corymbiform pedunculate racemose racemes; flowers ebracteate; pedicels very short persistent.[2] (*Northern Brazil.*[3])

8. **Synaptolepis** Oliv.[4] — Flowers hermaphrodite (nearly of *Lophostoma*), 5-merous; perianth long tubular-obconical, articulate at base; lobes 5, imbricate; the interior thicker. Squamules connate in slender erect subentire or shortly crenulate coronule of throat. Stamens 10, inserted at top of the tube under the coronule; the 5 oppositisepalous higher than the others; filaments of all short; anthers enclosed introrse, 2-rimose; apicule somewhat obtuse from short connective. Germen inserted at bottom of tube, free, at apex attenuated to a subulate style, dilated at stigmatose apex. Fruit enclosed by somewhat thickened base of perianth, finally subdry; seed . . . ?—A glabrous shrub, sometimes subscandent; branches opposite divaricate more or less open terete (blackish); leaves opposite, shortly petiolate, ovately acute penninerved; stipules 0; axillary buds conspicuous; flowers axillary, oftener solitary, shortly petiolate. (*Zanzibar.*[5])

9. **Stephanodaphne** H. Bn.[6]—Flowers hermaphrodite regular (nearly of *Lophostoma*), 5-merous; calyx hypocrateriform; tube elongate cylindrical; lobes of limb 5, short, imbricate, open. Disk thick inserted in throat, annular continuous, finally at reflexed margin unequally fimbriate-lobed. Stamens 10, inserted in 2 series under the throat; anthers subsessile obtuse introrse. Germen sessile, without disk, perceptibly attenuated to a conical style stigmatose

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[1] *DC. Prodr.* xiv. 600.

[2] In habit, leaves, structure of flowers very near to *Linostoma* Meissn. of which it formerly formed a section. It differs in inflorescence, absence of hypogynous disk, sometimes in nature of fruit clothed with calyx.

[3] Spec. 1, 2. Meissn. *Mart. Fl. Bras. Thymel.* (fasc. 14), 72 (*Linostoma*).

[4] *Hook. Icon.* ser. 3, 59, t. 1074. Oliver describes another species (*S. alternifolia*) remarkable for its alternate leaves (*Hook. Ic.* t. 1194).

[5] Spec. 1, 2 ?

[6] *Adansonia*, xi. fasc. 10.

at obtuse apex, densely villoso-setose; ovule 1, descending. Fruit ... ?—Shrubs; leaves alternate, subsessile or very shortly petiolate, unequal or subequal at base, entire or widely crenulate, penninerved; nerves transverse or oblique; veins netlike or lineate; flowers in long-pedunculate spikes, erect or cernuous, lateral or supra-alate, clavate at apex, elongate or shortly subcapitate, articulate, deciduous. (*Trop. east. Africa and islands.*[1])

10. **Dicranolepis** PL.[2]—Flowers hermaphrodite, 5-merous; tube of hypocrateriform calyx elongate, sometimes very slender; limb very imbricate, open. Squamules 10,[3] inserted in throat, alternating in pairs with, and equal to or longer than, the lobes of the calyx, widely petaloid. Stamens 10 inserted in throat, 2-seriate or spuriously 1-seriate; filaments free short; anthers introrse; the longer exserted. Germen sessile or shortly stipitate, stipate at base to hypogynous thinly membranous, unequally crenate or dentate, either regular, or sometimes more evolved disk; ovule 1, descending; style subterminal or lateral long, enclosed, at apex stigmatose clavate, capitate or orbicular. Fruit subdrupaceous (?) juiceless subglobular, enclosed by persistent base of calyx, seed subglobular, cotyledons of exalbuminous embryo thick hemispherical; radicle short superior. — Glabrous or oftener pilose shrubs; leaves alternate, 2-stichous, unequally oval or trapezoid; flowers subterminal or generally axillary, solitary or few glomerulate. (*Trop. west. Africa.*[4])

11. **Gnidia** L.[5]—Flowers hermaphrodite; tube of infundibuliform or subhypocrateriform (coloured) calyx cylindrical, oftener circumscissus above the germen, deciduous; lobes 5 (*Lasiosiphon*[6]) or oftener 4, imbricate, equally patent. Squamules 4, 5, petaloid, inserted in throat, alternating with and shorter than the lobes, either simple or 2-fid or partite (more rarely very small and scarcely perceptible). Stamens 8–12, inserted in 2-plicate series at

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[1] Spec. 2. H. BN. *loc. cit.*

[2] *Hook. Icon.* viii. t. 798; *Niger*, 496, t. 49.—MEISSN. *Prodr.* 599.

[3] Or 5, 2-fid, or 2-partite.

[4] Spec. about 4. H. BN. *Adansonia*, xi. 302.—WALP. *Ann.* i. 588.

[5] *Syst.* ed. 2, 22; *Gen.* n. 487.—*J. Gen.* 77.—LAMK. *Dict.* ii. 764; *Ill.* t. 291.—ENDL. *Gen.* n. 2100, 2102 (Suppl. iv. p. ii. 63).—MEISSN. *Linnæa*, xiv. 423; *Prodr.* 580.—*Dessenia* ADANS. *Fam. des Pl.* ii. 285.—*Struthia* ROY. *L. Gen.* ed. 2, 154.—*Nectandra* BERG. *Pl. Cap.* 131.—*Thymelina* HOFFMSG. *Verz.* i. 198 (part.).—ENDL. *Gen.* n. 2101.—*Canalia* SCHM. *N. Pflanz. Prag.* (1793), n. 5. — *Epichroxantha* ECKL. et ZEYH.—*Calysericos* (part.) ECKL. et ZEYH. (ex MEISSN.).

[6] FRESEN. *Flora* (1838), 602.—DCNE. *Jacquem. Voy. Bot.* 147.—ENDL. *Gen.* n. 2106[3].—*Enkleia* GRIF. *Calc. Journ. Nat. Hist.* iv. n. 13.—JACK, *Cat. Pl. Hort. Calc.* (1843), 138.— ? *Psilæa* MIQ. *Fl. Ind.-Bat.* Suppl. i. 355.

top of the tube, subssessile, the 4, 5 upper, oppositisepalous generally semi-exserted, sometimes abortive; the inferior same in number enclosed; anthers of all linear or oblong obtuse, introrse. Hypogynous disk short membranous or very short annular, often obsolete. Germen sessile; style lateral, equalling tube, at apex stigmatose capitate. Fruit nucular, enclosed by base of persistent calyx; seed sparsely albuminous.—Shrubs or undershrubs, either ericoid, or furnished with herbaceous or sub-coriaceous leaves alternate or opposite;[1] flowers[2] terminal, shortly spiked or oftener capitate; receptacle often pedunculate sometimes hemispherical, often (*Lasiosiphon*) villose, involucrate with floral leaves (few or ∞) imbricate (sometimes larger). (*India, south. and trop. east. and west. Africa and adjacent islands.*[3])

12. **Lachnea** Roy.[4]—Flowers hermaphrodite, 4-merous, regular or sometimes irregular; tube of perianth straight or curved, slender or infundibuliform, sometimes suburceolate (*Cryptadenia*),[5] narrowed above the germen and finally circumscissile deciduous; lobes of limb equal or irregular in 2-labiate limb; the posterior lip smaller (1-lobed); the anterior larger open-recurved (3-lobed); imbricate in prefloration. Stamens 8, inserted at top of tube, 2-seriate; the upper 4, oppositisepalous and exserted; filaments slender short, sometimes barbate; anthers ovate or oblong obtuse. Squamules 8,[6] alternating with stamens, sometimes very small, either partially concealed in the hairs of the throat, or inserted at or below the middle of the tube (*Cryptadenia*) and much lower than the anthers. Hypogynous disk 0. Germen sessile; style lateral capillary, apex stigmatose capitate oftener exserted. Fruit nucular, enclosed by persistent base of calyx; seed oftener sparsely albuminous.—Shrubs or small shrubs often ericoid branched; branches slender; leaves alternate or opposite, linear or acerose, glabrous or variously pilose; flowers[7] sometimes terminal solitary or oftener capitate involucrate or naked.—(*South. Africa.*[8])

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[1] The leafy branches are said to resemble the compound leaves of *Psilea* (of the *Leguminosæ*).

[2] White, yellow, lilac or reddish.

[3] Spec. about 65 L. f. *Suppl.* 225.—Wikstr. *Thymel.* 315.—Lindl. *Bot. Reg.* t. 757.—Dcne. *Voy. Jacquem. Bot.* (*Lasiosiphon*).—Miq. *Anal. Bot. Ind.* ii. 3, t. 1.—Walp. *Ann.* i. 587 (*Lasiosiphon*), 587 (*Enkleia*), 588 (*Psilosolena*).

[4] L. *Gen.* ed. 2, n. 382.—J. *Gen.* 77.—Gærtn. *Fruct.* iii. 195, t. 215.—Lamk. *Dict.* iii. 373; *Ill.* t. 292.—Endl. *Gen.* n. 2094; Suppl. iv. p. ii. n. 2193.—Meissn. *Linnæa*, xiv. 408; *Prodr.* 574.—*Lachara* L. *Syst.* ed. 2, 22.—*Gonophylla* Eckl. et Zeyh. MSS. (Meissn.)—*Radojitskya* Turcz. *Bull. Mosc.* (1852), 176.

[5] Meissn. *Linnæa*, xiv. 404; *Prodr.* 573.—Endl. *Gen.* Suppl. iv. p. ii. n. 2101.—*Calysericos* Eckl. et. Zeyh. (Meissn.).

[6] Staminodes ?

[7] Oftener rosy or lilac.

[8] Spec. about 22 L. *Spec.* ed. 1, 560.—Burm. *Afr.* t. 46, 48 (*Thymelæa*).—Thunb. *Fl. Cap.* 375 (*Pasesrina*), 378 (*Gnidia*).—Andr. *Bot. Repos.* t. 104.—Turcz. *Flora* (1853), 743 (*Radojitskya*).—*Bot. Mag.* t. 1295, 4143 (*Passerina*.).

13. **Dais** L.[1]—Flowers hermaphrodite, 3-merous (nearly of *Gnidia*); limb of infundibuliform (coloured) calyx patent; throat esquamate. Stamens 10, exserted 2-seriately in throat; filaments setaceous rather longer, all or only the upper exserted; anthers oblong obtuse. Germen girt at base with cup-shaped membranous disk; style lateral, apex stigmatose capitate or subclavate truncate. Fruit baccate (sometimes dry ?), enclosed by persistent base of calyx.—Shrubs; leaves alternate or opposite flat membranous rather large veined; flowers[2] capitate terminal; capitules solitary pedunculate, involucrate with 4, 2-cussately imbricate bracts. (*Madagascar, South. Africa.*[3])

14? **Coleophora** Miers.[4]—"Flowers hermaphrodite, 4–5-merous; calyx coloured infundibuliform; tube contracted from base to middle and there hirsute within, above and externally glabrous; throat esquamate; limb 4- or more rarely 5-fid; lobes acute reflexed fimbriately ciliate. Stamens 8–10, inserted 2-seriately in throat exserted; filaments short inflexed; anthers ovately rotundate subversatile; connective dorsal thick. Hypogynous cyathulus surrounding filiform stem of germen, springing from small glandular bed adnate to base of calyx, infundibuliform petaloid glabrous, equalling half of calyx, 4-fid; lobes linear erect. Germen stipitate oblong gibbous pilose; ovule pendulous from apex of cell; style terminal (?) filiform, equal in length to germen, enclosed glabrous; stigma capitate. Fruit. . . ?—A lofty tree; trunk gemmuliferous; gemmules aggregate, imbricately multibracteate; leaves. . . ?; flowers racemose." (*South. Brazil.*[5])

15. **Lasiadenia** Benth.[6]—Flowers hermaphrodite, 5-merous; tube of persistent green calyx cylindrical; throat bare; lobes of limb 5, very imbricate, patent. Stamens 10, enclosed; 5 superior, oppositipetalous inserted much higher than the rest and below the throat. Germen very hispid, girt at base with 5 squamules, minute

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[1] *Gen.* n. 540.—J. *Gen.* 77.—Gærtn. *Fruct.* i. 187, t. 39, fig. 3.—Lamk. *Dict.* ii. 254; *Ill.* t. 368.—Endl. *Gen.* n. 2093; Suppl. iv. p. ii. n. 2106.—Meissn. *Linnæa*, xiv. 388 (part.); *Prodr.* 528.

[2] Rosy or white?

[3] Spec. 2, 3. Wikstr. *Act. Holm.* (1818), 270, 348 (part.).—C. A. Mey. *Bull. S.-Pétersb.* iv. n. 4.—Dcne. *Ann. Sc. Nat.* sér. 2, xx. 51.—Curt. *Bot. Mag.* t. 147.—*Herb. Amat.* t. 214.

[4] *Ann. Nat. Hist.* ser. 2, vii. 196.—Meissn. *Prodr.* 548.

[5] Spec. 1, to us quite unknown, viz. *C. gemmiflora* Miers, *loc. vit.*—Meissn. *Mart. Fl. Bras. Thymel.* 70.

[6] *Hook. Lond. Journ.* iv. 632.—Endl. *Gen.* n. 2106^{9}.—Meissn. *Prodr.* 527.

long barbate; style eccentric thin, apex stigmatose thick ovoid-capitate obtuse, 10-costate. Fruit drupaceous, finally dry, enclosed by perianth; putamen osseous thin; seed exalbuminous.—A low divaricate ramose sericeo-pilose shrub; leaves alternate, ovate or ovato-lanceolate; flowers[1] terminal few (2–6) subcapitate at top of slender twig, ebracteate. (*Guiana*, *Venezuela*, *North. Brazil.*[2])

16. **Hargasseria** A. Rich.[3]—Flowers polygamous, 5-merous (nearly of *Gnidia*); calyx hypocrateriform, straight or incurved, throat esquamate. Stamens 10, exserted. Hypogynous squamules 5, long sericeo-pilose. Fruit . . . ?—Trees or shrubs; liber textile (of *Lagetta*); branches virgate; leaves alternate; flowers capitate, sometimes few; capitules pedunculate arranged in terminal corymbose racemes, exinvolucrate; receptacle discoid with long and dense white hairs.[4] (*Cuba.*[5])

17? **Goodallia** Benth.[6]—"Flowers diœcious, 5-merous; calyx wide tubular; tube villose within, 5-fid; throat esquamate. Stamens (in female flower 0) inserted in throat; the oppositipetalous a little longer than the calyx; the 5 alternate shorter. Squamules 10, perigynous near the base of the tube, linear glabrous. Germen (in male flower very small or 0), highly hirsute, girt at base with very small hypogynous long-haired scales; style short slender, apex stigmatose thick capitate; ovule 1, descending. Fruit ovoid hispid or fleshy, enclosed by somewhat enlarged calyx; testa of exalbuminous seed crustaceous.—A divaricate much-branched shrub; leaves alternate, elliptical, herbaceous, at base cuneate or rotundate, glabrous, thinly and densely veined, very shortly petiolate; flowers in few-flowered sessile terminal capituliform spikes. (*Guiana.*[7])

18? **Daphnopsis** Mart. and Zucc.[8]—Flowers diœcious; male calyx infundibuliform or campanulate; limb not separable, 4-fid; lobes imbricate, generally puberulent within; throat esquamate. Stamens 8, 2-seriately subsessile to throat; anthers ovate or ellipsoid (in female flower effete or rudimentary, sometimes 0). Female calyx[1] deciduous from base or persistent. Germen sessile (in male flower rudimentary or 0), girt at base with hypogynous membranous subentire or 4-fid or partite disk; style very short terminal, apex stigmatose capitate or subclavate. Fruit drupaceous (or sometimes baccate), slightly fleshy or finally dry, naked or girt with calyx, 1-spermous; seed exalbuminous.—Trees or shrubs;[2] leaves alternate flat; inflorescence[3] capitate or umbellate pedunculate, sometimes solitary, sometimes in ramose, 2-chotomous corymbs or cymes. (*Both trop. Americas.*[4])

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[1] Greenish white, half inch.

[2] Spec. 1. L. *rupestris* Benth.—Meissn. *Mart. Fl. Bras. Thymel.* 69, t. 29.

[3] *Cub.* xi. 193 (not Schied. et Deppe).—*Linodendron* A. Gray, *Pl. Wright.* i, 187.

[4] A genus distinguished from *Lasiosiphon*, a section of *Gnidia*, only by the esquamate throat of its perianth.

[5] Spec. 4 (flowers in 1 species said to be white. Meissn. *Prodr*, 522, n. 10 (*Daphnopsis ?*). —Griseb. *Cat. Pl. Cub.* 109.

[6] *Hook. Lond. Journ.* iv. 633 (not Bowd.).—Endl. *Gen.* n. 2106^{5}.—Meissn. *Prodr.* 527.

[7] Spec. 1. *G. guianensis* Benth.—Meissn. in *Mart. Fl. Bras. Thymel.* 68.

[8] *Nov. Gen. et Spec.* i. 65.—Endl. *Gen.* Suppl. iv. p. ii. n. 2106^{13}.—Meissn. *Prodr.* 520, 700.—*Hargasseria* Schied. et Deppe, ex C. A. Mey. *Bull. S.-Pétersb.* iv. n. 4 (not A. Rich.).—Endl. *loc. cit.* n. 2106^{8}.—*Nordmannia* Fisch. et Mey. —*loc. cit.*

19. **Lagetta** J.[5]—Flowers (nearly of *Lasiadenia*) hermaphrodite, 4-merous; tube (coloured) ovoid-oblong, often finally above the germen, circumscissously deciduous, above at the throat narrow esquamate, but there often furnished with a somewhat thickened disk lining the tube, otherwise densely hirsute; lobes of limb 4, valvate. Stamens 8, 2-seriate; four inferior, alternating with the lobes; anthers subsessile ovate, introrsely rimose. Germen sessile hirsute; ovule 1, descending; style terminal, apex stigmatose subclavate or capitate.[6] Fruit clothed with the entire calyx, finally unequally divided, or by its persistent base, dry, externally very pilose; embryo of externally somewhat fleshy seed thick fleshy; albumen oftener scanty, sometimes wanting above.—A tree; branches alternate glabrous; liber (textile) reticulate; leaves alternate, cordato-ovate, nitid reticulate; flowers[7] in terminal simple ebracteate few-flowered spikes. (*Antilles.*[8])

20. **Funifera** Leandr.[9]—Flowers (nearly of *Lasiadenia*) polygamo-diœcious, 4-merous; calyx tubular or campanulate, pubescent or

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[1] In the male often not the same.

[2] Habit of *Daphne* or *Funifera*.

[3] Flowers white or greenish.

[4] Spec. about 15. Sw. *Prodr.* 63; *Fl. Ind. Occ.* ii. 683 (*Daphne*).—K. *Synops.* i. 446 (*Daphne*).—H. B. K. *Nov. Gen. et Spec.* ii. 151 (*Daphne*).—Benth. *Pl. Hartweg.* 147 (*Daphne*, *Thymelæa*).—Griseb. *Cat. Pl. Cub.* 110.

[5] *Gen.* 77.—Lamk. *Dict.* iii. 376, 440; Suppl. iii. 236; *Ill.* t. 289.—Wikstr. *Act. Holm.* (1818), 293.—Gærtn. *Fruct.* iii. t. 215.—Spach, *Suit. à Buffon*, x. 437.—Endl. *Gen.* n. 2106; Suppl. iv. p. ii. n. 2106^{16}.—Meissn. *Prodr.* 526.

[6] With adherent glandular disk.

[7] White or slightly green.

[8] Spec. 1. *L. lintearia* Lamk.—Hook. *Kew Gard. Misc.* ii. t. 4.—Lindl. *Paxt. Fl. Gard.* i. n. 60, Icon.—Lem. *Fl. Jard.* t. 19.—A. Rich. *Cub.* xi. 192.—Griseb. *Cat. Pl. Cub.* 111.—*Bot. Mag.* t. 19.—*Lagetto* Lunan, *Hort. Jam.* i. 473.—*Daphne Lagetto* Sw. *Prodr.* 63; *Fl. Ind. Occ.* i. 680.

[9] Ex. C. A. Mey. *Bull. Acad. S.-Pétersb.* iv. n. 4.—Endl. *Gen.* n. 2106^{15}.—Meissn. *Mart. Fl. Bras.* xiv. 67; *Prodr.* 525.—*Neesia* Mart. MSS. (Meissn. not Bl.).—*Boscia* Velloz. *Fl. Flum.* iv. 150, t. 11?

hirsute, persistent, 4-fid; lobes equal, imbricate; throat esquamate. Stamens 8, 2-seriate; filaments short or very short; anthers erect oval enclosed (in female flower 0). Germen (in male flower rudimentary) hirsute; ovule 1,[1] descending (of *Lagetta*); style terminal slender, in fruit persistent and finally lateral, apex stigmatose capitate. Hypogynous disk consisting of squamules generally 8, linear-setaceous and sericeous pilose intermixed. Drupe finally siccate, closely enclosed by increased coriaceous hirsute perianth; putamen fragile; seed exalbuminous.—Shrubs; liber tenacious;[2] leaves herbaceous alternate, opposite or subverticillate elongate; flowers terminal or axillary to uppermost leaves cymose; cymes pedunculate or sessile, sometimes few- or 1-flowered; pedicels very short bracteate. (*Brazil.*[3])

21. **Peddiea** Harv.[4]—Flowers hermaphrodite; perianth (coloured) subcampanulate or cylindrical; lobes of limb 4, 5, imbricate, revolute, esquamate at throat.[5] Stamens 8–10; anthers enclosed, subsessile, inserted above the middle of the tube. Germen girt at base with cup-shaped membranous crenate disk; cell 1-ovulate;[6] style slender, shorter than tube of perianth, deciduous, at apex stigmatose depressed capitate. Drupe naked, with 1 pyrena; seed exalbuminous.—Glabrous shrubs; branches oftener 2-chotomous; bark thin; leaves alternate or approximate subopposite subsessile; flowers in terminal pedunculate umbels (?); pedicels articulate at base. (*South. and trop. West. Africa.*[7])

22. **Dirca** L.[8]—Flowers hermaphrodite; calyx obconico-campanulate glabrous, deciduous; limb obliquely cut above (hence slightly irregular) and there unequally crenulate or sometimes subentere.

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[1] Sometimes abnormally 2, 3 (Mart.), whence 2, 3, pyrenæ occasionally occur in fruit.

[2] Textile ductile.

[3] Spec. 2. Raddi, *Piant. Bras.* add. 12 (*Daphne*).—Mart. et Zucc. *Nov. Gen. et Spec.* i. 66, t. 34.

[4] *Hook. Journ.* (1840), ii. 266, t. 10.—Endl. *Gen.* n. 2106^{1}; Suppl. iv. p. ii. n. 2106^{14}.—Meissn. *Gen.* 331 (243); *Prodr.* 528, 700.—*Cyathodiscus* Hochst. *Flora* (1842), 240.—*Psilosolena* Presl, in *Abh. d. Boehm. Ges.* ser. 3, v. 532; *Bot. Bem.* 102.—*Harveya* Plant (Meissn.).

[5] Sometimes thinly glandulose-annular (on account of very thin disk being there a little thickened).

[6] Sometimes, as said, 2-ovulate; drupe hence 2-pyrenate (?)

[7] Spec. about 3. Walp. *Ann.* i. 588 (*Psilosolena*).

[8] *Diss. Chenon* (1751); *Gen.* (ed. 5), n. 437; (ed. 6), n. 486; *Amœn. Acad.* iii. 12, t. 1, fig. 7.—J. *Gen.* 79.—Lamk. *Dict.* iii. 287; *Ill.* t. 293.—Schkuhr, *Handb.* i. 337, t. 107.—Spach, *Suit. à Buffon*, x. 436.—Endl. *Gen.* n. 2091; Suppl. iv. p. ii. n. 2106^{6}.—Meissn. *Prodr.* 527.—*Dofia* Adans. *Fam. des Pl.* ii. 285.

Stamens 8, of which 4 are longer, further exserted: filaments subulate, alternating at insertion with 8 minute (sometimes withered) teeth; anthers basifixed introrse oblong obtuse. Germen sessile (of *Daphne*); style scarcely lateral slender exserted, at apex stigmatose scarcely capitellate. Fruit naked "baccate;" seed thinly albuminous.—A glabrous shrub; branches virgate; bark thickened at nodes; leaves alternate veined, deciduous; flowers[1] axillary cymose few (2–4) or more rarely solitary. (*North America.*[2])

23.—**Daphne** L.[3]—Flowers hermaphrodite, 4-merous; tube of tubular or subinfundibuliform, deciduous or sometimes persistent calyx not solute; lobes of 4-partite limb equal, alternately imbricate or more rarely tortuous; throat esquamate. Stamens 8, inserted in 2 series under the throat, 4 of which are inferior, alternisepalous; anthers subsessile, enclosed or subenclosed, oblong or subsagittate, introrse, 2-rimose.[4] Germen sessile or substipitate, girt at base with small or very small, often annular, disk; ovule 1, descending; micropyle extrorsely superior;[5] style terminal enclosed, short or subnil, sometimes rather longer (*Edgeworthia*[6]), at apex stigmatose subclavate or oftener capitate. Fruit oftener naked or coriaceous, sometimes enclosed by calyx; testa of descending seed crustaceous; albumen little fleshy or 0; cotyledons of inverted embryo fleshy plano-convex; radicle short superior.—Small trees or oftener shrubs;[7] leaves alternate or more rarely opposite, persistent or more rarely deciduous, oftener entire coriaceous penninerved; flowers[8] terminal or lateral capitate, sometimes more rarely lateral, sessile or pedunculate, sometimes involucrate; inflorescence rarely compound-ramose or axillary racemose.[1] (*Temp. Europe and Asia, North. Africa, Java.*[2])

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[1] Pale yellow, early.

[2] Spec. 1. *D. palustris* L.—PURSH, *Fl. Bor.-Amer.* i. 268.—HOOK. *Fl. Bor.-Amer.* i. 268.—A. GRAY, *Man.* ed. 5, 424.—*Bot. Reg.* t. 292.

[3] *Gen.* n. 311.—J. *Gen.* 77. LAMK. *Dict.* iii. 434; Suppl. iii. 314; *Ill.* t. 290.—WIKSTR. *Diss. de Daphne* (1817); *Act. Holm.* (1818), 294 (part.).—NEES, *Fl. Germ.* f. vii. t. 1.—SPACH, *Suit. à Buffon*, x. 438.—ENDL. *Gen.* n. 2092; Suppl. iv. p. ii. n. 2106^{7} (part.).—MEISSN. *Regensb. Denkschr.* iii. 282; *Prodr.* 530, 700.—*Thymeleæ* T. *Inst.* 594 (part.), t. 366,—GÆRTN. *Fruct.* i. 188, t. 39.—*Scopolia* L. F. *Suppl.* 60, 409 (not ADANS. nor FORST. nor JACQ. nor SM.).—*Eriosolena* BL. *Bijdr.* 651.—*Roumea* WALL. MSS. (not POIT.).—*Mezereum* C. A. MEY. *Bull. S.-Pétersb.* iv. n. 4.

[4] Pollen globose punctulate; pores minute very close, H. MOHL (*Ann. Sc. Nat.* sér. 2, iii. 314), in *Daphne*; sometimes in other genera (*Gnidia*, *Passerina*, *Dais*, *Pimelea*).

[5] Integument double.

[6] MEISSN. *Regensb. Denkschr.* iii. 280, t. 8; *Prodr.* 542 (not FALCON.).—ENDL. *Gen.* Suppl. iv. p. ii. n. 2106^{1}.

[7] Liber of caustic bark textile very tenacious.

[8] White, golden or pink, more rarely greenish, often early and odorous.

24. **Ovidia** Meissn.[3]—Flowers nearly of *Daphne*, 4-merous, by abortion 1-sexual diœcious (?); throat of funnel-shaped, 4-lobed, calyx, esquamate. Stamens 8, 2-seriate, inserted in throat; filaments slender; anthers (in female flower rudimentary) ovate introrse. Germen (in male flower sterile rudimentary), girt with 4 hypogynous glandules; style lateral or subterminal exserted, apex stigmatose capitate. Fruit "baccate piriform."[4]—Shrubs; leaves alternate subcoriaceous, inflorescence and other characters of *Daphne;* flowers[5] subumbellate at top of terminal or lateral peduncle, ebracteate. (*Western South America.*[6])

25. **Wikstrœmia** Endl.[7]—Flowers (nearly of *Daphne*) hermaphrodite, 4-merous; calyx tubular or funnel-shaped; throat naked; limb 4-fid, oftener separable from tube and deciduous. Anthers 8, 2-seriate, enclosed. Scales of hypogynous disk 4, free or connate; germen 1-ovulate; style terminal short or very short stigmatose-capitate. Fruit baccate or finally dry and other characters of *Daphne*.—Trees or shrubs; leaves opposite or alternate, foliaceous or subcoriaceous venose, deciduous; inflorescence capitate or um-

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[1] Sect. (Meissn.) 5: 1^0 *Mezereum* (Spach), leaves herbaceous deciduous; calyx deciduous; berry oftener fleshy.—2^0 *Daphnanthes* (C. A. Mey.; *Cneoroides* Spach, *Ill. Pl. Or.* t. 305), leaves persistent; flowers terminal; calyx subpersistent.—3^0 *Gnidium* (Spach), leaves annual; racemes terminal ramose, ebracteate; calyx finally deciduous.—4^0 *Laureola* (Spach; *Laureoloides* Spach), leaves coriaceous perennial coetaneous; racemes axillary.—5^0 *Eriosolena* (Bl.; *Scopolia* L. f.), leaves coriaceous; capitules lateral pedunculate involucrate; sepals often tortuous; to which add.—6^0 *Edgeworthia* (Meissn.), leaves highly coetaneous, head pedunculate in uppermost axils, style rather long subclavate; anthers subsagittate.

[2] Spec. about 35. Pall. *Fl. Ross.* i. 53, t. 35.—Lour. *Fl. Cochinch.* (ed. 1790), 236.—Schreb. *Dec.* i. 13, t. 7.—Vahl, *Symb.* i. 28.—Tratt. *Arch.* i. 120, t. 133.—Thunb. *Fl. Jap.* 159.—Bl. *Bijdr.* 651.—Sm. *Spicil.* ii. t. 18; *Ic. ined.* ii. 34, t. 34.—Sieb. et Zucc. *Abh. Math.-Phys. Kl. Baier. Ak.* iv. p. iii. 199; *Fl. Jap.* i. 137, t. 75.—Lindl. *Journ. Hort. Soc.* i. 147; ii. 34, t. 1.—Wall. *As. Res.* xiii. 388, t. 9.—Sieb. *Hook. Lond. Journ.* vi. 46 (*Edgeworthia*).—Benth. *Fl. Hongk.* 296.—Jaub. et Spach, *Ill. Pl. Or.* t. 303–306.—Miq. *Fl. Ind.-Bat.* i. 877; *Ann. Mus. Lugd.-Bat.* iii. 133, 135 (*Edgeworthia*).—Gren. et Godr. *Fl. de Fr.* iii. 57.—*Bot. Reg.* t. 1177; (1847), t. 48.—*Bot. Mag.* t. 206, 313, 1282, 1875.—Walp. *Ann.* i. 582.

[3] *Prodr.* 524 (not Rafin.).

[4] C. Gay, *Fl. Chil.* v. 314.

[5] Greenish or yellow.

[6] Spec. 4. H. B. *Syn. Pl. Æquin.* i. 447, (*Daphne*).—H. B. K. *Nov. Gen. et Spec.* ii. 151 (*Daphne*).—Pœpp. et Endl. *Nov. Gen. et Spec.* ii. 60, t. 191 (*Daphne*).

[7] *Prodr. Fl. Norfolk.* 47; *Gen.* n. 2105; Suppl. iv. p. ii. n. 2106^1.—Meissn. *Denkschr. Regensb. Bot. Ges.* iii. 286; *Prodr.* 543.—Decne. in *Jacquem. Voy. Bot.* 144, t. 149.—C. A. Mey. *Bull. S.-Pétersb.* iv. n. 4 (not Schrad. nor Spreng.).—*Capura* L *Mantiss.* 224 (not Bl.).—*Diplomorpha* Meissn. *Denkschr. Regensb.* iii. 289.

bellate,[1] axillary or terminal, solitary or more rarely corymboso-ramose. (*Trop. and subtrop. Asia, Oceania.*[2])

26. **Stellera** Gmel.[3]—Flowers (nearly of *Daphne*) hermaphrodite, 4–6-merous; calyx hypocrateriform, articulate above the germen, deciduous; throat esquamate. Stamens 8–12, inserted in 2-series under the throat; anthers enclosed or superior semiexserted. Germen subsessile, barbate at apex, girt at base with annular or cup-shaped membranous, sometimes oblique disk; style terminal or lateral, shorter than germen, and at apex stigmatose hispidulo-papillose subovoid. Fruit nucular, loosely clothed with persistent tumescent base of calyx; pericarp thin crustaceous; seed scantily albuminous.—Small shrubs or perennial herbs; leaves alternate lanceolate; flowers[4] terminal racemose, spicate or subcapitate. (*West. Middle and North. Asia.*[5])

27. **Thymelæa** T.[6]—Flowers (nearly of *Stellera* or *Daphne*) hermaphrodite or sometimes 1-sexual; calyx (coloured or herbaceous) infundibuliform or urceolate-tubular, persistent or tardily deciduous; throat esquamate. Stamens 8, inserted in 2 series in the tube; the higher enclosed or exserted. Germen destitute of hypogynous disk; style terminal or oftener lateral very short, apex stigmatose capitate. Fruit nucular, naked or oftener enclosed by calyx; seed but little or not at all albuminous.—Herbaceous subshrubby or oftener shrubby plants; leaves alternate; flowers[7] axillary solitary or glomerate few, bracteolate. (*Central and South. Europe, North Africa, North. and West. Asia.*[8])

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[1] Sometimes excrescent from axis, subspicate.

[2] Spec. about 22. L. Spec. i. 511 (*Daphne*).—Forst. *Prodr.* n. 168 (*Daphne*).—Lour. *Fl. Coch.* (ed. 1790), 236 (*Daphne*).—Blanco, *Fl. de Filip.* ed. 1, 309 (*Daphne*).—Benth. *Hook. Journ.* (1853), 195.—Bunge, *Enum. Pl. Chin. Bor.* 58 (*Passerina*).—Mor. et Zoll. *Arch. Nat. Ges. Ned. Ind.* (1844), 615 (*Eriosolena*).—Seem. *Fl. Vit.* 206.—Miq. *Fl. Ind.-Bat.* i. 878; Suppl. 141, 354; *Ann. Mus. Lugd. Bat.* iii. 134.—Meissn. *Prodr.* 550, n. 9, 10 (*Stellera*).—Walp. *Ann.* i. 589.

[3] L. *Diss. Dasson* (1747), *Amœn.* i. 399; *Gen.* (ed. 5), n. 439; (ed. 6), n. 488 (not Gærtn.).—C. A. Mey. *Bull. S.-Pétersb.* iv. n. 4.—Endl. *Gen.* Suppl. iv. p. ii. n. 2098.—Meissn. *Prodr.* 548 (part.).—*Chamæjasme* Amm. *Ruth.* 16, t. 2.

[4] White, yellow or reddish.

[5] Spec. about 8. Wikstr. *Act. Holm.* (1818), 321 (*Passerina*).—Ledeb. *Fl. Ross.* iii. 546 (*Passerina*).—Jaub. et Spach, *Ill. Pl. Or* iv. t. 301, 302.—Meissn. *Denkschr. Regensb.* iii. 287 (*Wikstrœmia*).

[6] *Inst.* 594 (part.).—Endl. *Gen.* Suppl. iv. p. ii. 65.—Meissn. *Prodr.* 551.—*Stellera* Gærtn. *Fruct.* i. 186, t. 39. fig. 2 (not Gmel.).—*Lygia* Fasan. *Att. Acc. Napol.* (1787), 235, t. 19.—*Piptochlamys* C. A. Mey. *Bull. S.-Pétersb.* iv. n. 4.—*Chlamydanthus* C. A. Mey. *loc. cit.*

[7] Greenish or yellow, more rarely white or reddish, often small.

[8] Spec, about 20. Clus. *Hisp. Icon.* 176.—(*Sanamunda*).—Barrel. *Icon.* t. 221 (*Sanamunda*).—L. *Spec.* (ed. 1), 356, 509 (*Daphne*), 512, 519 (*Stellera*).—Forsk. *Fl. Ægypt.-Arab.* 81 (*Passerina*).—Vahl, *Symb.* i. 28; iii. 58.

28. **Arthrosolen** C. A. Mey.[1]—Flowers (nearly of *Thymelæa*) hermaphrodite, 4–5-merous; limb of funnel-shaped (coloured) calyx regular, 4–5-partite, finally open; inferior part of tube articulate below middle persistent around fruit; throat esquamate. Stamens 8–10, 2-seriate, inserted in throat; the upper semiexserted; anthers subsessile, oblong or linear. Germen destitute of hypogynous disk; style lateral slender, longer than germen, enclosed, at apex stigmatose capitate, extending to the throat. Fruit nucular ovoid. —Shrubs or undershrubs; leaves alternate or opposite sessile; flowers either axillary solitary or very few, or terminal, capitate and involucrate. (*South. or West. Africa.*[2])

29. **Diarthron** Turcz.[3]—Flowers hermaphrodite; tube of glabrous calyx elongate, narrow (herbaceous), above the germen constricted articulate, below persistent around fruit, above deciduous; throat esquamate; limb (coloured) erect, 4-fid. Stamens 4–8, enclosed, inserted 1–2-seriately in throat; anthers subsessile oblong, introrsely rimose. Germen girt with thin annular disk, glabrous, 1-ovulate; style subterminal or lateral, apex stigmatose slightly or not at all thickened obtuse. Nucule enclosed by calyx; seed slightly albuminous.—Slender herbs; leaves alternate linear; flowers[4] in very slender terminal and lateral spikes, ebracteate. (*Central Asia.*[5])

30. **Passerina** L.[6]—Flowers hermaphrodite (nearly of *Thymelæa*); tube of cup-shaped (coloured) calyx thin, narrowed above germen and there solute; limb 4-partite patent deciduous; throat esqua-

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(*Daphne*).—Allion. *Fl. Pedem.* i. 139; *Auct.* 9. —Pourr. *Chlor. Narbon.* 27 (*Passerina*).—Lamk. *Dict.* iii. 436, 437; *Ill.* t. 290 (*Daphne*).—DC. *Fl. Fr.* iii. 72 (*Passerina*), 356 (*Daphne*); vi. 466 (*Passerina*).—Desf. *Fl. Atl.* i. 331, t. 95 (*Passerina*).—Wikstr. *Act. Holm.* (1818), 320 (*Passerina*).—Guss. *Fl. Sicul. Prodr.* i. 466; Suppl. i. 114 (*Stellera*).—Cambess. *Enum. Pl. Balear.* 183 (*Passerina*).—D'Urv. *Enum. Pl. Archip.* 42.—Sibth. et Sm. *Fl. Græc.* i. t. 355 (*Daphne*).—Nees, *Fl. Germ.* iii. t. 47 (*Passerina*). —Boiss. *Voy. Esp.* ii. t. 157 (*Passerina*).—Gren. et Godr. *Fl. de Fr.* iii. 60 (*Passerina*).

[1] *Bull. S.-Pétersb.* iv. n. 4. — Endl. *Gen.* Suppl. iv. p. ii. n. 2100.—Meissn. *Prodr.* 559.

[2] Spec. about 8. Thunb. *Fl. Cap.* 75, 376 (*Passerina*). — Wendl. *Obs.* 19, t. 2, fig. 19, 20 (*Passerina*).—Andr. *Bot. Cab.* t. 311 (*Passerina*).—Presl, *Bot. Bem.* 107.—Meissn. *Linnæa*, xiv. 390, 396, 398 (*Passerina*).

[3] *Bull. Mosc.* (1832), v. 204; (1852), ii. 464, t. 11.—Endl. *Gen.* n. 2096; Suppl. iv. p. ii, n. 2099.—Meissn. *Prodr.* 558.

[4] Very small, purple or sometimes 2-coloured.

[5] Spec. 2. Ledeb. *Fl. Ross.* iii. t. 544.—Fisch. et Mey. *Bull. Mosc.* (1839), 170.—Kar. et Kir. *Enum. Pl. Alt.* n. 801.—C. A. Mey. *Bull. S.-Pétersb.* iv. n. 4.—Jaub. et Spach, *Ill. Pl. Or.* ii. t. 105.—Walp. *Ann.* i. 105.

[6] *Hort. Cliff.* 146, t. 11; *Gen.* (ed. 1), n. 856. —C. A. Mey. *Bull S.-Pétersb.* iv. n. 4.—Spach, *Suit. à Buffon*, x. 446.—Endl. *Gen.* Suppl. iv. p. ii. n. 2097.—Meissn. *Prodr.* 561.

mate. Stamens 8, inserted 2-seriately in throat; filaments subulate, often coherent at base, exserted at apex; anthers ovate. Germen destitute of disk; style lateral, apex stigmatose semiexserted capitate. Fruit nucular, enclosed by persistent base of tube or sometimes finally naked; pericarp crustaceous or sometimes slightly fleshy, very rarely (*Chymococca*[1]) baccate; seed albuminous.—Ericoid shrubs; twigs tomentose or lanate; leaves opposite, linear acerose, convex at back; flowers[2] sessile in uppermost axils solitary or in terminal sometimes comose or short subcapitate spikes. (*South Africa.*[3])

31. **Struthiola** L.[4]—Flowers hermaphrodite, 4-merous (nearly of *Gnidia*; glandules of throat 4, or oftener 8–12, exserted, fleshy or horny; each densely setose at base and there oftener confluent in somewhat prominent ring. Stamens 4, alternating with lobes of calyx; anthers subsessile; cells linear, adnate within to connective produced beyond the cells. Germen sessile, destitute of hypogynous disk; style lateral, subequal to tube of calyx, at apex capitate stigmatose. Fruit nucular, enclosed by persistent base at calyx; seed albuminous.—Ericoid shrubs or undershrubs; branches generally straight slender; leaves opposite or sometimes alternate sessile, oftener linear; flowers[5] sessile in uppermost axils, solitary or binate; calyx 2-bracteolate. (*South Africa.*[6])

32 ? **Kelleria** Endl.[7]—Flowers hermaphrodite, 4-merous; calyx (coloured) funnel shaped, 4-fid; squamules 4; inserted in throat, or 8, oppositisepalous in pairs; tube continuous. Stamens 4, alternating with lobes; filaments inserted in throat subulate, exserted; anthers ovate obtuse, 2-rimose. Germen sessile, 1-ovulate, destitute of hypogynous disk; style lateral or subterminal filiform exserted, at apex stigmatose capitate, deciduous. Fruit nucular ovoid, finally naked;

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[1] Meissn. *Prodr.* 665.

[2] Oftener rather reddish, small.

[3] Spec. 4, 5. L. *Spec.* (ed. 1), 560 (*Lachnæa*); *Mantiss.* i. 236.—Thunb. *Prodr.* 75; *Fl. Cap.* 374.—Poir. *Dict.* v. 40.—Wikstr. *Act. Holm.* (1818), 232.—Lodd. *Cat.* (1816), 18.—W. *Spec.* ii. 434.—Meissn. *Linnæa*, xiv. 299.—Wendl. *Obs.* 18, t. 2, fig. 15.

[4] *Mantiss.* n. 1244.—J. *Gen.* 77.—Lamk. *Ill.* t. 78.—Poir. *Dict.* vii. 475.—Gærtn. f. *Fruct.* iii. 194, t. 125.—Endl. *Gen.* n. 2099; Suppl. iv. p. ii. n. 2096.—Meissn. *Linnæa*, xiv. 463; *Prodr.* 566.—*Belvala* Adans. *Fam. des Pl.* ii. 285.

[5] White, golden or reddish.

[6] Spec. about 20. Thunb. *Fl. Cap.* 382.—Houtt. *Pfl. Syst.* v. 358, t. 40, fig. 2.—Burm. *Afr.* 127, t. 47 (*Thymelæa*).—Retz. *Obs.* iii. 25, 26.—Hornem. *Hort. Hafn.* ii. 955.—Wikstr. *Thymel.* 286.—Ait. *Hort. Kew.* (ed. 2), i. 272.—Rœm. et Sch. *Syst.* iii. 20, 330.—Wendl. *Obs.* 9, t. 2.—Andr. *Bot. Repos.* t. 113, 119, 149.—Lodd. *Bot. Cab.* t. 11, 74, 75, 141.—*Bot. Mag.* t. 1212, 2138.

[7] *Gen.* Suppl. iv. p. ii. n. 2095.—Meissn. *Prodr.* 665.—*Daphnobryon* Meissn. *Prodr.* 566.

seed copiously albuminous.—Dwarf cæspitose musciform shrubs or undershrubs; stems sometimes prostrate ramose; leaves opposite sessile small densely imbricate; flowers[1] terminal subcapitate few, pedunculate or subsessile, imbricate in upper leaves, involucrate.[2] (*New Zealand*, *Australia*, *Tasmania*, *Borneo*.[3])

33. **Drapetes** Lamk.[4]—Flowers of *Kelleria*; calyx funnel-shaped, 4-fid; throat esquamate; limb articulate above germen, deciduous; persistent base surrounding fruit. Seed and other characters of *Kelleria*.—A small dwarf undershrub; leaves small sessile decussate densely imbricate and inflorescence[5] of *Kelleria*. (*South America*, *Magellanic continent and islands*.[6])

34 ? **Schœnobiblus** Mart. and Zucc.[7]—"Flowers diœcious,[8] 4-merous; male calyx (corolline) 4-partite; tube very short funnel-shaped, pilose at bottom; throat esquamate; lobes patent linear, glabrous within. Hypogynous scales 0. Stamens 4, exserted, opposite lobes of calyx and subequal and adnate to them below; filaments filiform; anthers oblong, dorsally affixed above base; rudiment of germen 0. Female flower . . . ?—A tree or shrub; leaves few; umbels terminal pedunculate. (*North. Brazil*.[9])

35. **Pimelea** Banks and Soland.[10]—Flowers hermaphrodite or rarely polygamo-diœcious (nearly of *Struthiola* or *Gnidia*), 4-merous; tubular throat of (coloured) calyx esquamate; tube continuous or

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[1] Rather small.

[2] A genus by Bentham (*Fl. Austral.* vi. 35) conjoined with *Drapetes*, to which indeed it is very close, but from which it is decidedly distinct by the scales of the throat (absent in *Drapetes*).

[3] Spec. about 3. Hook. *Lond. Journ.* ii. 497, t. 17 (*Drapetes*).—Hook. f. *Fl. N.-Zel.* i. 223; ii. 222; *Handb. N.-Zeal. Fl.* 245; *Hook. Icon.* t. 895; *Hook. Journ.* (1853), 299, t. 7 (*Drapetes*).

[4] *Journ. d'Hist. Nat.* i. 186, t. 10, fig. 1; *Ill.* t. 915.—Poir. *Dict.* Suppl. ii. 523.—Banks. *Gærtn. Fruct.* iii. 199, t. 215, —J. *Ann. Mus.* vii. 479.—Wikstr. *Thymel.* 284.—Endl. *Gen.* n. 2097; Suppl. iv. p. ii. n. 2094.—Meissn. *Prodr.* 518 (not Benth.).

[5] Calyx petaloid coloured.

[6] Spec. 1. *D. muscoides* Lamk.—Gaudich. *Voy. Uran. Bot.* 133.—D'Urv. *Mém. Soc. Hist. Nat. Par.* iv. 605.—*D. muscosus* Rœm. et Sch. *Syst.* iii. 333.—Hook. f. *Antarct. Voy. Bot.* 343 (not *Fl. N.-Zel.*).—C. Gay, *Fl. Chil.* v. 317.

[7] *Nov. Gen. et Spec.* i. 65.—Endl. *Gen.* Suppl. iv. p. ii. n. 2106^{12}.—Meissn. *Prodr.* 519.

[8] "White, puberulous."

[9] Spec. 1. *S. daphnoides* Mart. et Zucc.—Meissn. *Mart. Fl. Bras. Thymel.* 65, t. 28, fig. 1

[10] Gærtn. *Fruct.* i. 186, t. 39. —Dryand. *Ann. Bot.* ii. 205.—Wikstr. *Act. Holm.* (1820), 118, 270, 273.—Spach, *Suit. à Buffon*, x. 448.—Endl. *Gen.* n. 2098; Suppl. iv. p. ii. 60.—Payer, *Organog.* 482, t. 96.—Meissn. *Prodr.* 496, 700.—*Banksia* Forst. *Char. Gen.* n. 4 (not L. nor Domb.).—*Cookia* Gmel. *Syst.* i. 24 (not Sonner. nor Spreng.).—*Thecanthes* Wikstr. *loc. cit.* 269, 271.—Endl. *Icon.* t. 11.—*Heterolæna* Fisch. et Mey. *Ind. Sem. Hort. Petrop.* (1845), 46.—*Gymnococca* Fisch. et Mey. *loc. cit.* —*Macrostegia* Turcz. *Bull. Mosc.* (1852), iii. 177.

finally divided above germen; limb patent or finally reflexed, imbricate. Stamens 2, inserted in throat and opposite exterior lobes of calyx; filaments generally evolute exserted; anthers introrse; Germen sessile; hypogynous disk minute or 0; style lateral, enclosed or exserted, apex stigmatose capitate. Fruit nucular, enclosed by persistent base of calyx; seed slightly albuminous.—Shrubs undershrubs or more rarely herbs; leaves opposite or sometimes alternate; flowers[1] capitate terminal, very rarely spicate or axillary few or solitary; globular or hemispherical pubescent receptacle of capitules persistent, involucrate with larger imbricate floral leaves. 4 or ∞, sometimes coloured. (*Australia*, *Tasmania*, *New Zealand*, *Java.*[2])

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[1] White, yellow or pink.

[2] Spec. about 90. R. Br. *Prodr. Fl.N.-Holl.* 359.—Sm. *N.-Holl.* i. 31.—Meissn. *Pl. Preiss.* i. 602; ii. 268.—Labill. *Pl. N.-Holl.* i. 10, t. 5, 7.—Vahl. *Enum.* i. 305.—Hook. f. *Fl. Tasm.* i. 332; *Fl.N.-Zel.* i. 220; *Handb.* N.-*Zeal. Fl.* 242—F. Muell. *Fragm.* v. 73, 109; vi. 159; vii. 2.—Benth. *Fl. Autral.* vi. 1.—Lodd. *Bot. Cab.* t. 540.—Sweet, *Fl. Austral.* t. 53.—Raoul, *Choix de Pl.* 42.—*Bot. Reg.* t. 1268, 1439, 1578, 1582, 1827; (1838), t. 24; (1839), *Misc.* 66; (1841), t. 33.—*Bot. Reg.* t. 891, 3270, 3276, 3281, 3288, 3330, 3459, 3721, 3833, 3950.—Walp. *Ann.* i. 584.

L. ULMACEÆ.

I. ELM SERIES.

In this extensive family, each series of which, with many authors, constitutes a distinct family, we shall study first the Elms[1] (fig. 89–94) the flowers of which are hermaphrodite or polygamous. On its depressed or slightly concave receptacle is observed a gamosepalous calyx, often subcampanulate, and with five divisions more or less

Ulmus campestris.

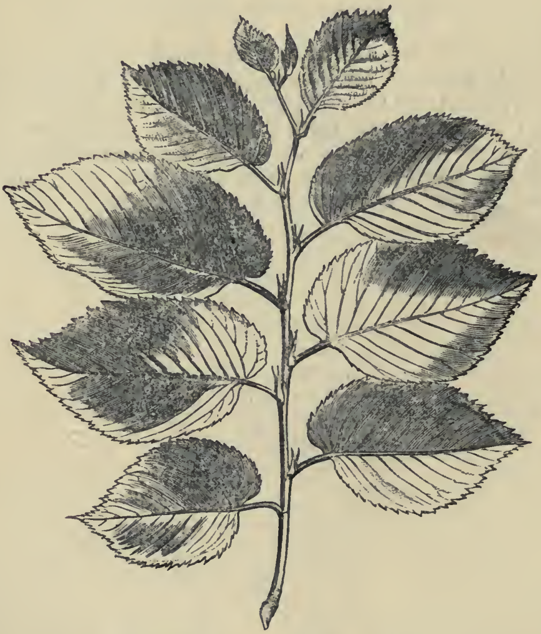

Fig. 89. Foliaceous branch ($\frac{1}{3}$).

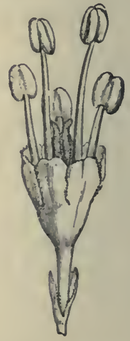

Fig. 91. Flower ($\frac{4}{1}$).

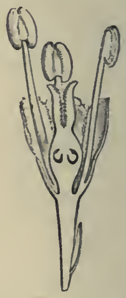

Fig. 92. Long. sect. of flower.

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[1] *Ulmus.* T., *Inst.* 601, t. 372.—L. *Gen.* n. 239.—Adans. *Fam. des Pl.* ii. 377.—J. *Gen.* 408.—Gærtn. *Fruct.* i. 224, t. 49.—Poir. *Dict.* iv. 609; Suppl. iv. 187.—Lamk. *Ill.* t. 185.—Turp. *Dict. Sc. Nat.* Atl. t. 282.—Nees, *Gen.* ii. 34.—Spach, *Ann. Sc. Nat.* sér. 2, xv. 359; *Suit à Buffon*, xi. 99.—Endl. *Gen.* n. 1850; Suppl. ii. 29; iv. p. ii. 33.—Payer, *Fam. Nat.* 167.—Pl. in *Ann. Sc. Nat.* sér. 3, x. 259; *DC. Prodr.* xvii. 154.—*Microptelea* Spach, *Ann. Sc. Nat. loc. cit.* 358; *Suit. à Buffon*, xi. 113.—Endl. *Gen.* n. 1849[2].

deep, imbricate in the bud, marcescent. The andrœcium is composed of an equal number of superposed stamens. They are inserted at a greater or less height on the margin of the receptacular cup,[1] and are formed each of a filament, erect in the bud, and a bilocular anther, exserted, extrorse, dorsifixed and dehiscing by two longitudinal clefts.[2] The gynæcium, inserted in the centre of the receptacle, is composed of a sessile or stipitate ovary, sterile in the male flower, formed of two carpels, in such a manner that here and there it may have two uniovulate cells (fig. 92); it is surmounted by a style which divides above into two equal branches, furnished within with stigmatic papillæ. But, most frequently, only one of the cells is fertile, and the ovule which it encloses, inserted near the top of the internal angle, is descending, anatropous, with the micropyle directed upwards and outwards.[3] The fruit is a flattened samara, the entire margin of which is produced to a peripheric membranous wing, ciliate or not at the edge, and its cavity, somewhat unsymmetrical, with reticulate partition, encloses a descending seed whose fleshy embryo is destitute of albumen. Its flat cotyledons correspond to the faces of the fruit,

Ulmus campestris.

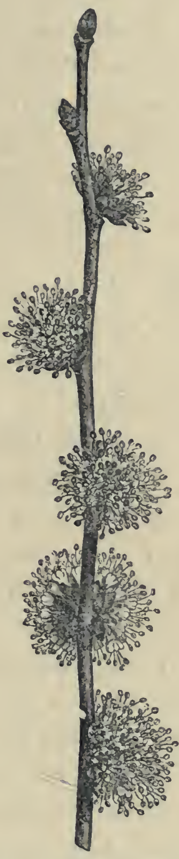

Fig. 90. Floriferous branch.

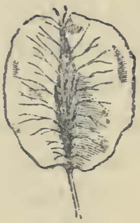

Fig. 93. Fruit.

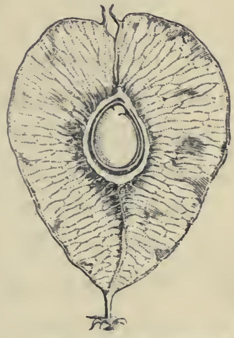

Fig. 94. Long. sect. of fruit ($\frac{3}{1}$).

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[1] That is to say a little perigynously.

[2] The pollen is (H. Mohl, *Ann. Sc. Nat.* sér. iii. 2, 312) "ellipsoid flat; five oval pores, surrounded by a narrow halo, situated along the equator (*U. campestris*)."

[3] It has a double coat.

and its superior radicle is rectilinear. There are Elms with flowers having six, seven or eight divisions.—They are trees or shrubs,[1] of which some fifteen species are known,[2] inhabiting the temperate regions of the northern hemisphere of both worlds. The branches are often suberose and sometimes alate. The leaves (fig. 89) are alternate, distichous, simple, often serrate, penninerved, unsymmetrical at the base,[3] accompanied with lateral stipules. The leaves almost always fall in winter, and it is before their development that the numerous, inconspicuous flowers[4] show themselves emerging from axillary scaly buds, and arranged in cymes or glomerules more or less compound.

In India there is an Elm, *Ulmus integrifolia*, the sepals of which are free and its andrœcium diplostemonous. Its embryo instead of being flat has two conduplicate cotyledons. It has been made a genus under the name of *Holoptelea*. Another tree, growing in the marshes of North America, which the older botanists placed in the Elm genus, has the flowers of this genus with the foliage of certain Hornbeams (*Carpinus*); but its dry indehiscent fruit has a thin mesocarp, dilated on every side into soft and papillose lamellæ or points; characters which distinguish the genus *Planera*. *Abelicea*, formerly classed among the Elms, afterwards with *Planera*, has its habit, foliage and flowers; but the fruit, at first drupaceous, then with mesocarp withered and thin, is of smooth surface. It terminates in a small recurved beak; which gives it some resemblance to a retort with a full body and very short neck. It is traversed on one side by a marginal crest, not very prominent in most species which are natives of Crete, the Caucasus, and Eastern Asia, but developed more to a wing in *Z. Davidii*, a tree of northern China, of which a genus has also been made under the name *Hemiptelea*.

The Lotus trees (*Celtis*) constitute a distinct subseries, characterised chiefly by a drupaceous fruit (fig. 97). That is the general character of a group which has been raised to the rank of even a sub-order (*Celtideœ*). Their flowers (fig. 95, 96) are polygamo-monœcious and in structure nearly like those of the Elm. The pentamerous perianth is imbricated, and they have five stamens superposed to the sepals, with filaments inflexed in the bud but which straighten themselves, often elastically, at the time of anthesis. The stamens are primarily introrse. The unilocular ovary encloses one descending campylotropous ovule and is surmounted by a style with two stigmatiferous branches (fig. 95). The putamen encloses one seed the embryo of which is accompanied by a little mucous albumen and has two conduplicate cotyledons.—Lotus (*Celtis*) consists of trees or shrubs of all warm and temperate regions of the globe. Their leaves are alternate and triplinerved at the base.

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[1] PLANCHON divides the genus into 3 sections (or sub-genera): 1 *Oreoptelea* (SPACH); 2 *Dryoptelea* (SPACH); 3 *Microptelea* (SPACH) founded on the form of the perianth, the time of appearance of the flowers, the form and position of the pedicel, the ciliation or otherwise of the margins of the samara.

[2] FOUGER. *Mém. Acad. Sc. Par.* (1787), t. 2. —JACQ. *Hort. Schœnbr.* t. 261.—W. *Enum. Hort. Berol.* 295.—MICHX. *Fl. Bor. Amer.* i. 172 —WITH. *Arrang.* ii. 275.—ROXB. *Fl. Ind.* ii. 67.—NUTT. *Trans. Amer. Phil. Soc.* n. ser. v. 169.—SOND. *Regensb. Flora* (1851), 43.—A GRAY, *Man.* ed. 5, 442.—CHAPM. *Fl. S. Unit. St.* 416. GREN. et GODR. *Fl. de Fr.* iii. 105.—WALP. *Ann.* iii. 424.

[3] The internal half is the larger.

[4] Green, yellowish or reddish.

Celtis australis.

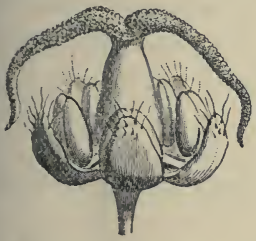

Fig. 95. Flower ($\frac{4}{1}$).

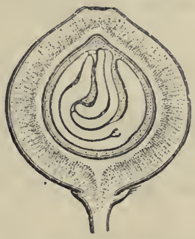

Fig. 97. Long. sect. of fruit ($\frac{2}{1}$).

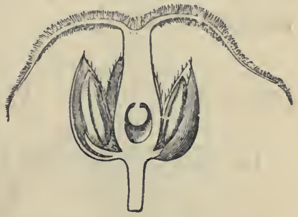

Fig. 96. Long. sect. of flower.

From the Lotus plants the following genera are distinguished only by characters of very small value. *Gironniera*, Asiatic and Australian trees, ally themselves with *Celtis* by their flowers with imbricate sepals and leaves with independent stipules. But the fruit, surmounted by a persistent style, with two branches not plumose, is accompanied at the base by the persistent calyx; and the flowers are diœcious instead of being polygamo-monœcious. *Trema*, natives of nearly all warm regions of the globe, have the free stipules and polygamo-diœcious flowers of *Celtis*, with the persistent calyx at the base of the fruit like *Gironniera*; but the prefloration of the sepals is such that they are valvate-induplicate below and imbricate at the summit. *Parasponia*, inhabiting the same countries as *Gironniera*, has the polygamo-monœcious flowers and imbricate calyx of *Celtis* and the drupaceous fruit with persistent calyx at its base of *Trema*. But the style-branches are plumose, and the two stipules of the same leaf are united in a single concave axillary blade, like those of the *Artocarpeæ*. *Aphananthe*, trees of the same countries as *Gironniera* and *Parasponia*, have the calyx imbricate and persistent, and stigmata not plumose as in *Gironniera*, stipules united in pairs like those of *Parasponia*; but the flowers are monœcious and not diœcio-polygamous. The same is the case with those of *Aphananthe*, spinous trees of the Cape, with fruit accompanied at the base with the persistent calyx and filiform style-branches, but possessing a valvate-induplicate calyx and stipules united to each other in one large membranous axillary blade, which is early detached in one piece, nearly like those of *Parasponia.*

Ampelocera cannot, apparently to us, be removed from *Celtis*, to which, by its stamens 10 to 15 in number, it bears nearly the same relation as *Holoptelea* to *Ulmus*. The gynæcium is also quite that of a Lotus, and the fleshy fruit is monospermous. It comprises trees of tropical America, with alternate leaves and membranous caducous stipules.

II. MULBERRY SERIES.

In the Mulberry[1] (fig. 98–101), the unisexual, monœcious or diœcious flowers are tetramerous, and the straight almost flat or, in the male flower, slightly depressed receptacle, bears four decussate

Morus alba.

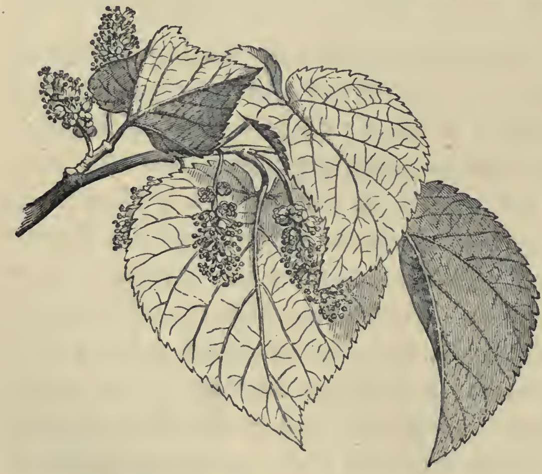

Fig. 98. Male floriferous branch.

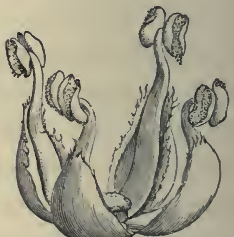

Fig. 99. Male flower ($\frac{6}{1}$).

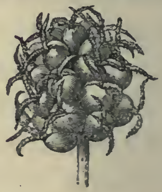

Fig. 100. Female inflorescence.

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[1] *Morus* T. *Inst.* 589, t. 362.—L. *Gen.* n. 1055.—Adans. *Fam. des Pl.* ii. 377.—J. *Gen.* 402.—Schkuhr. *Handb.* t. 290.—Gærtn. *Fruct.* ii. 199, t. 126.—Poir. *Dict.* iv. 373; Suppl. iv. 33.—Lamk. *Ill.* t. 762.—Spach, *Suit. à Buffon*, xi. 39.—Endl. *Gen.* n. 1856.—Payer, *Fam. Nat.* 171.—H. Bn. *Adansonia*, i. 214, t. 8, fig. 1–12. —Bur. *DC. Prodr.* xvii. 237.

sepals, in prefloration alternately imbricate in the bud, and four superposed stamens, inserted under a slightly developed rudiment of the gynæcium. Each of these is formed of a filament inflexed and incurved in prefloration, afterwards elastically straightened at the time of anthesis, and of a bilocular introrse anther dehiscing by two longitudinal clefts. The calyx of the female is similar to that of the male flower and surrounds[1] a free gynæcium, formed of a unilocular ovary[2] surmounted by a style, soon divided into two divergent, subulate branches, covered internally with stigmatic papillæ. Under the summit of the cell is inserted a descending ovule, with micropyle directed upwards and outwards.[3] The fruit becomes a drupe with sarcocarp of little thickness, especially along the faces of the depressed putamen. It is surrounded by persistent sepals, become fleshy and succulent, packed closely together. The descending seed encloses under its integuments a fleshy albumen which surrounds a recurved embryo, with oblong and fleshy cotyledons and incumbent radicle, at the summit directed upwards. The Mulberries are trees and shrubs, with milky or opal juice, inhabiting all the warm regions of the globe. They have alternate, distichous, entire, dentate or lobed leaves, with the petiole accompanied by two lateral caducous stipules. The flowers are axillary. The male inflorescence resembles a cylindrical or slightly compressed catkin. But following their development, as we have done,[4] the axis of these apparent spikes is found to be a blade more or less elongate and flattened, bearing upon one part of its surface only, a very large number of small cymes or glomerules, whilst the remainder is bare. It is, therefore, a mixed inflorescence, and it is the same as what has been described as the female spike or catkin. Of Mulberries a score of species[5] have been described; the number ought to be reduced to about half-a-dozen.

Morus nigra.

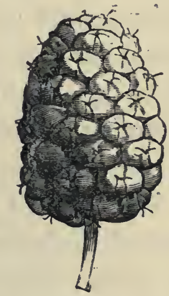

Fig. 101. Compound fruit.

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[1] Between it and the pistil are seen, in early age, the stamens the development of which is generally soon arrested.

[2] Dicarpellous and bilocular at first; but one of the two cells soon ceases to grow.

[3] Its coat is double.

[4] *Compt. Rend. Acad. Sc. Par.* lii. 19; *Adansonia, loc. cit.* 221, t. 8, fig. 9–11.

[5] L. *Spec.* (ed. 3), ii. 1398.—W. *Spec.* iv. p. i. 368.—Ser. *Descr. et Cult. des. Mûr.* 191.—Loud.

Morus Ampalis, a species from Madagascar and the Mascarene islands, has been distinguished with a generic title under the name of *Ampalis*, because its male calyx is less clearly imbricate than that of the Mulberries and because its fruit, arranged in a false spike much more elongate, encloses one seed with embryo destitute of albumen, fleshy plano-convex cotyledons and accumbent radicle. It is a genus of little value. The same may be said of *Paratrophis*, trees of New Zealand and the Pacific Ocean which have all the external characters and the diœcious inflorescence of *Ampalis*, but the sepals are not accrescent and do not become fleshy around the fruit, at the same time the embryo, almost totally destitute of albumen, has the radicle accumbent to the cotyledons, which are much larger and nearly foliaceous, unequal, conduplicate and longitudinally plicate, in such a manner that the largest envelopes the smallest in its concavity. *Pseudomorus* is equally oceanic and almost constantly diœcious. The leaves are accompanied by caducous amplexicaul stipules, and the flowers are nearly those of the preceding genera. The female calyx, like that of *Paratrophis*, persists without growing to the base of the drupaceous fruit. But the seed encloses an embryo destitute of albumen or nearly so, and the radicle is accumbent to the flat, thick and fleshy cotyledons.

In tropical America, the analogue of the preceding types is *Trophis*, which, with the same general characters, presents these two peculiarities: the female floral receptacle becomes more or less concave; which renders the unilocular and uniovulate ovary partly inferior, and the female (perigynous) calyx gamosepalous, in the form of a conical sac with superior dentate opening, closely surrounding the gynæcium and the fruit (*Trophideæ*).

The *Broussonetieæ* are easily distinguished from the preceding genera by their female glomerules being collected on a spherical receptacle[1] instead of grouped on a common axis more or less elongate and flattened (in general form of a spike). This can be easily

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Arbor. et Frut. Brit. iii. 1343.—H. B. K. *Nov. Gen. et Spec.* ii. 33.—Miq. *Pl. Jungh.* 42; *Fl. Ind.-Bat.* Suppl. i. 415.—A. Gray, *Man.* ed. 5, 444.—Chapm. *Fl. S. Unit. St.* 415.—Benth. *Fl. Hongk.* 323.—Seem. *Fl. Vit.* 245.—Gren. et Godr. *Fl. de Fr.* iii, 102.

[1] This enables us to consider provisionally as an intermediate type between the two groups *Mailliardia borbonica* (Frapp. et Duchtre, *Note s. l'Ile de la Réun.* Ann. P. 3;—Bur. *Prodr.* 220), a tree unknown to us, which, with spikelike male inflorescence, has solitary female flowers, but accompanied by an involucre formed of numerous imbricate and pluriseriate bracts. The uniovulate ovary is described as "semi-adherent;" a character which at the same time brings this plant near *Trophis* (vulg. *Bois de sagaie, de requin, de Gaillard, de Maillet*).

verified in *Broussonetia*, or the Paper-Mulberry (fig. 102–107), beautiful trees of temperate and tropical Asia, with leaves very variable in form, and diœcious tetramerous flowers. The male inflorescence is amentiform and analogous to that of the Mulberry. The female flowers have a gamophyllous urceolate perianth and a gynæcium analogous to that of *Morus*. but with a simple style, filiform at its stigmatiferous extremity. The fruit is formed of a great number of stipitate drupes, collected on a spherical receptacle, and the fleshy mesocarp thickens only at the edges in a sort of forceps with elastic branches which drive and project the putamen as the seeds, analogous to those of the Mulberries, mature. *Maclura* differs very little from *Broussonetia*, of which it has the flower and male inflorescence. But the female flowers are destitute of a calyx with independent folioles, like that of the

Broussonetia papyrifera.

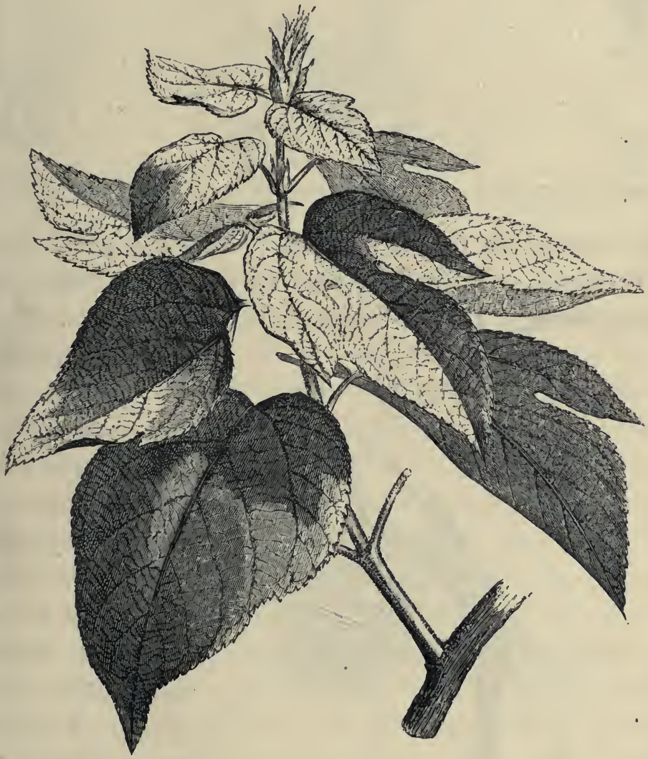

Fig. 102. Foliaceous branch ($\frac{1}{2}$).

Mulberries and are buried in the cavities hollowed in the common receptacle; so much so that the fruit which succeeds is completely encased in this receptacle accrescent after fecundation. The style is single or formed of two very unequal branches. They are American trees. Beside *Maclura* is placed *Caturus*, having the same inflorescence, with the female flowers of *Broussonetia*, but the fruit, sessile on the common receptacle, is surrounded by the persistent urceolate calyx. The male flowers are generally trimerous; but in one species, of which a genus, *Allæanthus*, has been made, they are tetramerous and tetrandrous. They are unarmed trees and shrubs of tropical Asia and Oceania. With the fundamental organisation of flowers, andrœcium and gynæcium of the preceding genera, *Plecospermum* and *Cardiogyne* are distinguished in that the inflorescence of both sexes has a spherical receptacle on which the glomerules are

Broussonetia papyrifera.

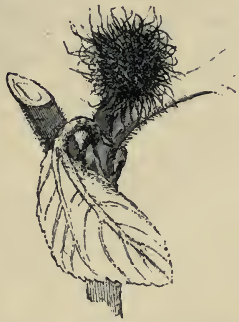

Fig. 105. Female inflorescence.

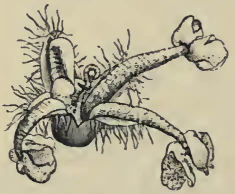

Fig. 104. Male flower ($\frac{4}{1}$).

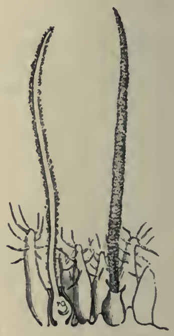

Fig. 106. Female flowers ($\frac{4}{1}$).

Broussonetia papyrifera.

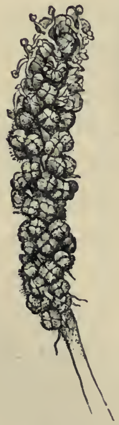

Fig. 103. Male inflorescence.

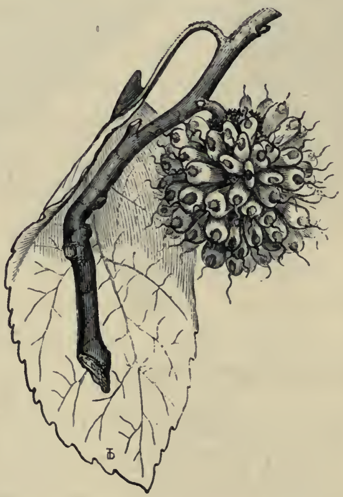

Fig. 107. Fructiferous branch.

arranged (*Plecospermeœ*). In *Cardiogyne*, the female calyces are independent of each other, and the seeds have a large embryo with foliaceous conduplicate and strongly plicate cotyledons, enveloping each other and covering the incumbent radicle. In *Plecospermum*, the female calyces are united externally and the style emerges by a small aperture at the summit. The embryo also has cotyledons incumbent to the radicle and enveloping each other; but they are thick, fleshy and not plicate. *Cardiogyne*, plants of Zanzibar, has globular and sessile female inflorescence. *Plecospermum*, like the preceding spinous, but natives of India, has the same pedunculate inflorescence.

Streblus, a small Asiatic and Australian tree, has given its name to a secondary group (*Strebleœ*), which differs from the preceding in the female flowers never being collected in spikes or capitules (of glomerules), but almost always solitary.[1] The male inflorescence of *Streblus* is similar to that of *Cardiogyne* and *Plecospermum*. It is this which distinguishes it from *Pseudostreblus*, an Indian tree (?) with male flowers united in a compound cyme, on the multiple ramifications of which they are unilateral, and from *Taxotrophis*, a spinous shrub of Java, the male inflorescence of which is pedunculate catkins, covered with glomerules, analogous to those of *Maclura*. In *Phyllochlamys*, spinous shrubs, natives of the same countries as *Streblus*, the male flowers[2] are collected in a sort of capitule with a thick and very short peduncle, and this capitule is surrounded by large accrescent bracts which form around it a foliaceous involucre. Finally *Diplocos*, a spinous shrub of Ceylon, the flowers of which are constructed like those of the preceding genera, has the amentiform and stipitate male inflorescence of *Taxotrophis*, and female inflorescence compound and ramified (covered with glomerules), nearly like the male inflorescence of *Pseudostreblus*.

Dorstenia (fig. 108-113) has given its name to a small group (*Dorstenieœ*) distinguished from all the preceding genera by the inflorescence including flowers of both sexes. This inflorescence, as in many preceding types, consists of glomerules either of male flowers only, or of one female flower surrounded by male flowers. But these glomerules are united on a common receptacle or principal axis the form of which is extremely variable in *Dorstenia.* It may be a circular platform, flat or slightly convex or concave (fig. 112), or a cup of round or quadrilateral contour, or unequally divided into two (fig. 108), or into a greater number (fig. 113) of similar or dissimilar branches, the upper surface of which is surrounded by bracts forming a slightly developed involucre. Most frequently the receptacle is depressed at the point of insertion of the female flower into a small hollow in which the latter is encased (fig. 109), whilst the surrounding male flowers are inserted near the margin. *Dorstenias* are found in all the tropical regions of Africa, of Asia and especially of America; they are shrubs and, more generally, perennial herbs, often with very short stem. The leaves are alternate, entire or more or less deeply cut, and accompanied with lateral stipules, most frequently persistent and hardening on the stem. *Fatoua,* which closely resembles them in the organisation of its flowers, is an herb of eastern Asia and the warm parts of Oceania, having altogether the habit and foliage of a nettle, and the inflorescence formed of androgynous cymes. Instead of being sessile,

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[1] More rarely 2–4-nate.

[2] The stamens as far as we have seen are short, with a straight erect filament and an erect introrse anther. By that, this genus, inseparable from the preceding, would approach quite as near to *Artocarpus*. But (according to the figure of it given by WIGHT) they appear finally rather far exserted.

Dorstenia multiformis.

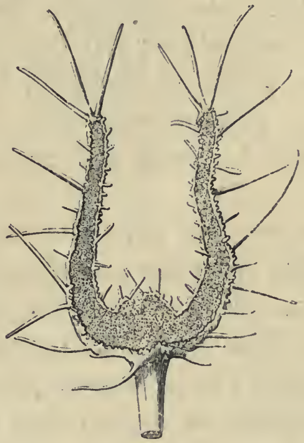

Fig. 108. Inflorescence.

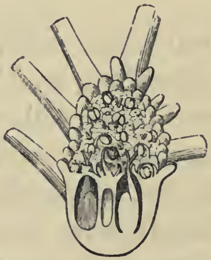

Fig. 109. Portion of inflorescence ($\frac{3}{1}$).

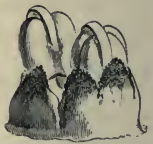

Fig. 110. Male bud ($\frac{8}{1}$).

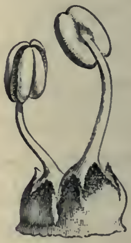

Fig. 111. Male flower in bloom.

Dorstenia brasiliensis.

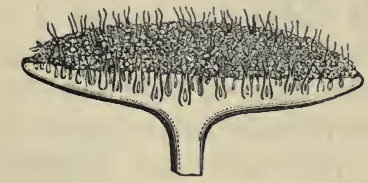

Fig. 112. Long. sect. of inflorescence ($\frac{2}{1}$).

they are collected on the little developed but much branched axes of one or two axillary pedunculate cymes resembling at a distance a small capitule. In *Bleekrodia*, shrubs of Borneo and Madagascar, the flowers are also grouped in capituliform cymes, a female being central and terminal, surrounded by younger male flowers in considerable number. Both have a valvate calyx in the form of a gamophyllous sac in the female; and the embryo, destitute of albumen, has very unequal cotyledons. *Sloetia*, a Javan shrub, has an inflorescence, the elongate and flattened axis of which, covered with floral glomerules, has the general form of male inflorescence of the Mulberry and *Maclura*. But a single one or a very small number of the glomerules (which are collected on one of the faces of this receptacle and on a portion of the other) bears in the centre a tetramerous female flower with sessile and prominent gynæcium. All the rest are formed of only male flowers, trimerous and triandrous, with valvate calyx.[1]

Dorstenia cuspidata.

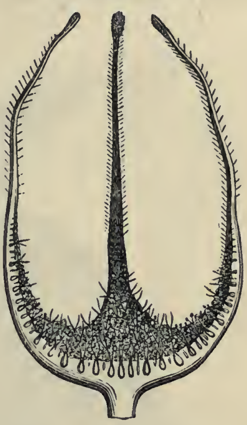

Fig. 113. Long. sect. of inflorescence.

III. BREADFRUIT SERIES.

The Breadfruit trees[2] (*Artocarpus*) (fig. 114–118) have given their name to this group, often raised to the rank of a family, but they are not the most complete type. They have monœcious flowers collected in great number on unisexual inflorescences. In the male flowers is observed a perianth formed of two or four calycinal folioles, free from each other or united below to an extent generally inconsiderable and imbricate in prefloration. They surround an andrœcium represented by a single stamen. This is formed of a filament primarily straight, instead of curved in prefloration (and this is the character to which the greatest importance has been attached in distinguishing this series from the preceding), and an anther with two cells, each dehiscing by a longitudinal cleft. In the female flowers there is a concave receptacle, ordinarily very deep, hollowed in the form of pits in the substance of the floral receptacle itself, the margin of which supports a gamosepalous calyx,[1] perforated only at the summit. At the bottom of the hollows is a free gynæcium, formed of a sessile or shortly stipitate ovary, surmounted by an eccentric style the stigmatiferous summit of which is entire, variable in form, or divided sometimes into two or three branches. At first, the dicarpellar gynæcium,[2] like that of the

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[1] In this group has been placed, not without some doubt, *Trymatococcus* Pœpp. a Brazilian tree the juice of which, it is said, is not milky; for if its stamens have, according to Pœppig, filaments inflexed in the bud, they do not always appear so in the adult flowers under our eyes; and in most of its characters, the plant seems very near *Pseudolmedia*. There is also an African *T.*—*Calius lactescens* (Blanco, *Fl. d. Filip.* ed. 1, 698.—Bur. *Prodr.* xvii. 278), remains also a most doubtful genus. The flowers of the two sexes are said to be mixed in axillary pedunculate fascicles or glomerules. The males have four stamens elastically straightened at anthesis, and the females have a superior ovary, surmounted by a style with two long revolute branches. (See p. 167, note 12).

[2] *Artocarpus* L. *Syst. Veg.* n. 1426.—J. *Gen.* 402.—Lamk. *Dict.* iii. 207; Suppl. iii. 130; *Ill.* t. 130.—Turp. *Dict. Sc. Nat.* Atl. t. 286.—Spach, *Suit. à Buffon*, xi. 69.—Endl. *Gen.* n. 1868.—Tréc. *Ann. Sc. Nat.* sér. 3, viii. 109, t. 4, fig. 100–120.—Payer, *Fam. Nat.* 172.—H. Bn. *Adansonia*, iv. 79, t. 5.—*Rima*, Sonner. *Voyag.* 99. t. 57–60.—*Sitodium* Banks, *Gærtn. Fruct.* i. 345.—*Rademachia* Thunb. *Act. Holm.* xxxvi. 252.—*Polyphema* Lour. *Fl. Coch.* (ed. 1790.), 546.

Artocarpus incisa.

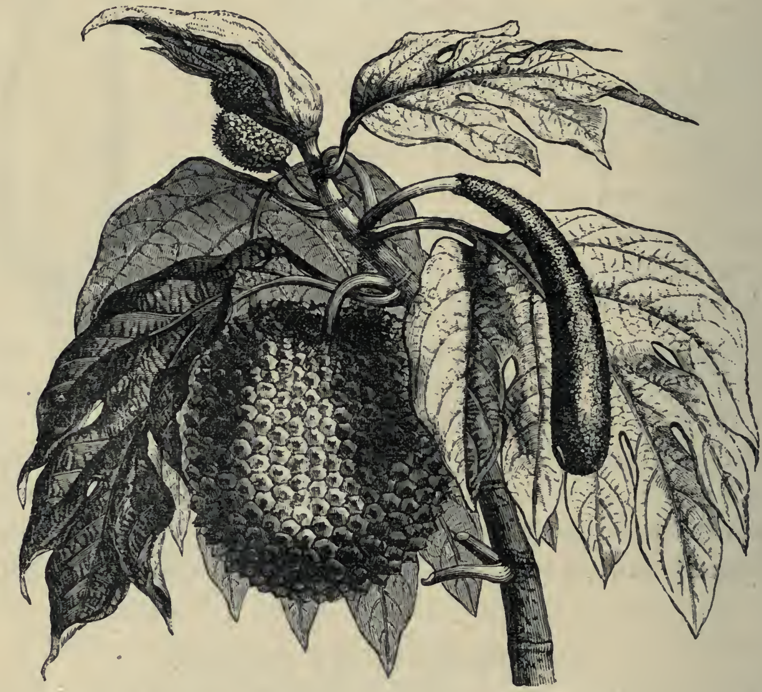

Fig. 114. Floriferous and fructiferous branch ($\frac{1}{4}$).

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[1] This is consequently perigynous. At other times the sepals were supposed hypogynous, but united in a tube and also welded, except at the summit, with those of the neighbouring flowers.

[2] Sometimes the number of carpels is three,

Mulberries, has two cells; but one of them is early arrested in its development,[1] whilst the other, alone fertile, presents, in its internal angle, a thick placenta,[2] which supports a single descending anatropous ovule, with micropyle directed upwards and outwards,[3] and ordinarily capped with an obturator proceeding from the placenta. The ovaries become achenes[4] whose descending seeds enclose a curved embryo, destitute of albumen, with a short superior radicle and two fleshy cotyledons generally very unequal. All these fruits are imbedded in the slightly fleshy and fecular substance of the common floral receptacle, on the surface of which are seen only the slightly prominent remains of the perianth. The whole therefore constitutes a compound fruit, often spherical or ovoid. *Artocarpus* consists of beautiful trees with soft wood, milky juice, alternate leaves, simple, entire or more or less deeply cut. They are accompanied by a very large supra-axillary blade, formed by the union of two lateral stipules, inserted a little higher than the leaf and for some time enveloping the summit of the branch with a cap in the form of an elongate cone; after this, they detach themselves at the base leaving on the branch, a little above the petiole, a nearly circular scar. The monœcious flowers are separated on distinct inflorescences the receptacle of which is spherical or more or less elongate. They are in fact arranged in a great number of glomerules, with or without bracts and bracteoles with peltate summit. The males are

Artocarpus integrifolia.

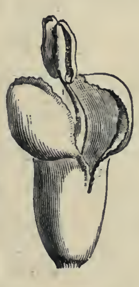

Fig. 115. Male flower ($\frac{12}{1}$).

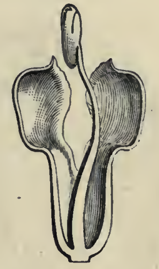

Fig. 116. Long. sect. of male flower.

Artocarpus integrifolia.

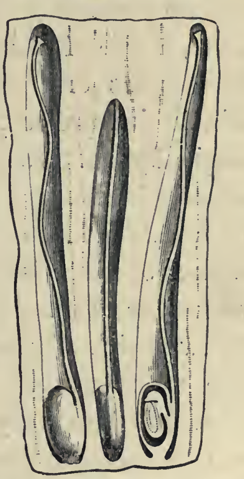

Fig. 117. Portion of female inflorescence.

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and it may even persist to the end; the ovary is then trilocular and triovulate.

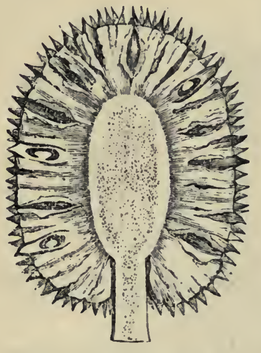
[1] Exceptionally it continues to develop, and the ovary has two fertile cells.

[2] It may be free in its upper portion (*Adansonia*), iv. t. 5, fig. 3, 4).

[3] There is a double coat.

[4] When fresh, they are in reality drupes, but with a mesocarp ordinarily very thin.

free on the surface of the receptacle, whilst the females are more or less deeply sunk in pitlike depressions (fig. 117) of which the gynæcium occupies the bottom without contracting any adherence with their integuments. Some twenty species[1] of *Artocarpus* have been distinguished, all natives of tropical Asia and Oceania.



Artocarpus integrifolia.

Fig. 118. Long. sect. of young female flower.

Acanthinophyllum strepitans, a small Brazilian tree, with prickly leaves, like those of certain *Sorocea*, has nearly all the characters of *Artocarpus*; but its monandrous male flowers are said to be destitute of perianth and the female flowers are collected, though not mutually adherent, on the surface of the spherical receptacle. The fruit is surrounded by the perianth become pulpy and encloses a seed with straight embryo and plano-convex cotyledons. There appears to to be no perianth properly so called in the male flowers of *Parartocarpus*, a tree of Borneo, the spherical and pedunculate receptacle of which bears erect stamens separated from each other by bracts variable in number, free, obtuse or swollen at the summit and marginally contiguous. Below the receptacle, the summit of the peduncle is enlarged and bears a small involucre of unequal folioles. The female flowers of this genus are not known. The male inflorescence of *Treculia* has also a spherical receptacle; the stamens are two to four in number in each flower. The style is divided above into two thick stigmatiferous branches, and the fruit, imbedded in a large common spherical receptacle, encloses a seed the embryo of which has two very unequal cotyledons, the larger reflexed upon itself to envelop the smaller. *Treculia* comprises trees of tropical western Africa. The flowers are monœcious or diœcious, and the receptacle which bears them is accompanied at the base by a small involucre formed of imbricate bracts, as in *Parartocarpus*. In the female inflorescence, the cavities in which the pistils are lodged are surrounded superiorly by a great number of male flowers the anthers of which appear sterile.

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[1] Forst. *Prodr.* 64; *De Plant. Esc. Oc.*, 23.—W. *Spec.* iv. 188.—Spreng. *Syst.* iii. 804.—Tuss. *Fl. des Ant.* t. 2–4.—Wight, *Icon.* t. 678–682.—Kl. *Linnæa*, xx. 535.—Hassk. *Flora*, ii. 18.—Zoll. *Verz.* ii. 89.—Boj. *Hort. Maur.* 290.—Hook. *Bot. Mag.* t. 2833, 2834, 2869–2871.—Miq. *Pl. Jungh.* 44. *Mart. Fl. Bras. Urtic.* 121; *Fl. Ind.-Bat.* i. p. ii. 284; Suppl. i. 171, 417.—Teysm. et Binn. in *Nat. Tijdschr. Ned. Ind.* xxv. 401.—Kruz, *op. cit.* xxvii. 182.—Thw. *Enum. Pl. Zeyl.* 262.—Benth. *Fl. Hongk.* 325.—Seem. *Fl. Vit.* 255.—Walp. *Ann.* i. 658.

Bagassa in this group may be considered the analogue of *Maclura* in the *Morus* series. The male flowers are unknown, but the female flowers have a superior perianth, formed of four thick and fleshy sepals, contiguous without a true union in nearly the entire length of their margins and free only at their obtuse summit. They surround a free ovary, similar to that of *Artocarpus* and surmounted by an eccentric style with two unequal or nearly equal branches. The fruit encloses a seed the embryo of which, surrounded by an inconsiderable albumen, has oblong foliaceous cotyledons and a curved accumbent radicle, the summit of which is directed downwards. *Bagassa* consists of trees from Guyana with opposite leaves and very numerous female flowers sessile upon the entire surface of a common spherical receptacle. *Cudrania* is doubtless, on its side, the analogue of *Plecospermum* and *Cardiogyne*. It has their alternate leaves, spinous branches, globose inflorescence, and replicate embryo, with conduplicate cotyledons; but the stamens, generally four in number, instead of incurved, have rectilinear or even somewhat outwardly recurved filaments. The *Cudranias* are all Asiatic and Oceanic. *Helianthostylis*, a tree of northern Brazil, also much resembles *Maclura* in its external characters. The male flowers are in spherical capitules on the surface of which they are inserted by a short pedicel. The gamosepalous calyx, in four divisions, surrounds four superposed stamens, with extrorse anthers, definitively exserted. The filaments are borne on the base of a long rudimentary gynæcium the ovary of which is stipitate, uniovulate, and the style long exserted. The fruit, globose and scabrous, encloses under a thin spherical pericarp one seed the embryo of which has two or three large thick and fleshy cotyledons.

Olmedia has given its name to a sub-series (*Olmedieæ*) in which the receptacle of inflorescence has the form of a cup generally of little depth or even nearly plane the margin of which bears, as in a capitule of a composite, an involucre formed of several ranks of unequal, alternate imbricate bracts. In the male capitules, the flowers are indefinite in number. In the female inflorescence, there are often also a great number, more rarely a single one. In *Olmedia*

Antiaris toxicaria.

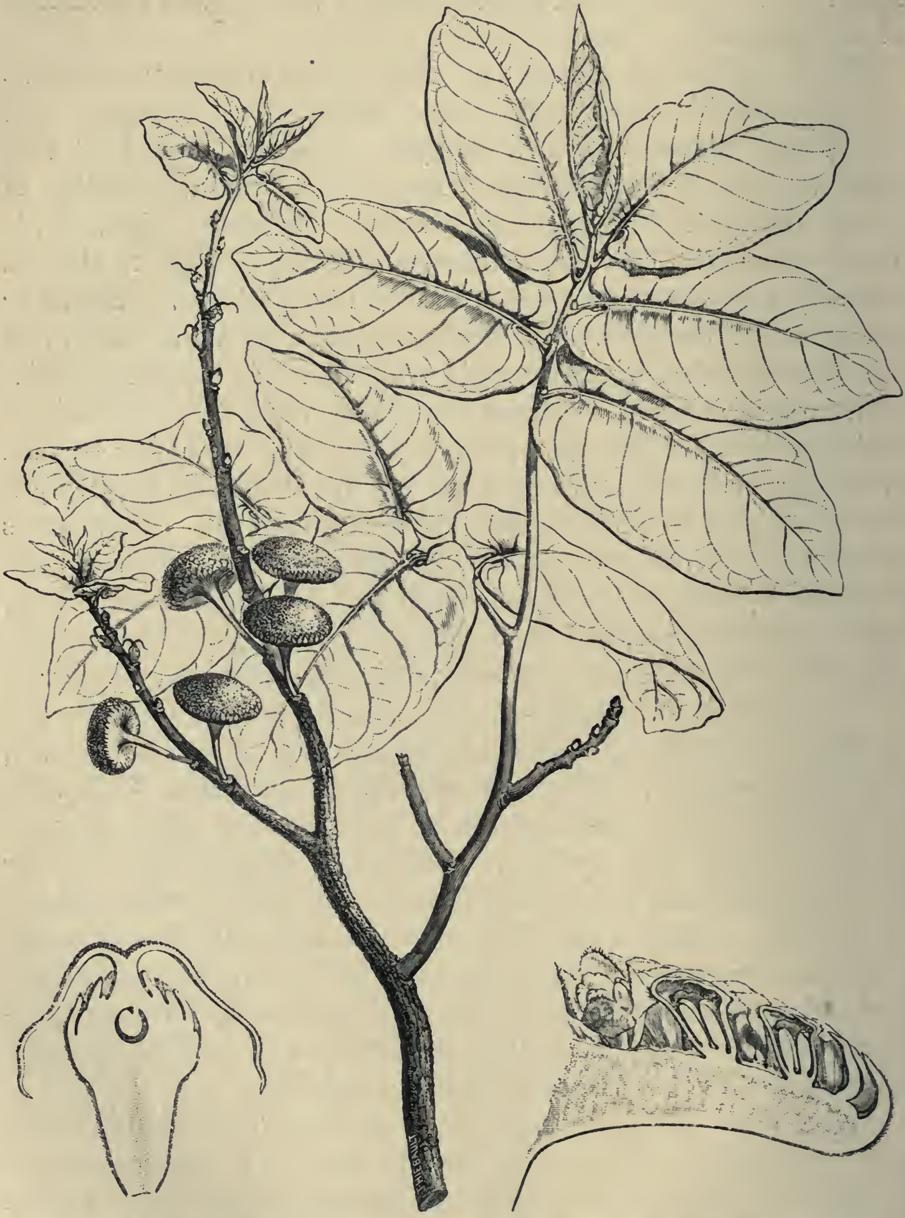

Fig. 121. Long. sect. of female flower ($\frac{4}{1}$).

Fig. 119. Floriferous branch.

Fig. 120. Portion of male inflorescence ($\frac{6}{1}$).

the flowers are diœcious; the males have a tetramerous calyx and four stamens superposed to its divisions; the females have a free gynæcium, the ovary of which, surmounted by a style with two long stigmatiferous subulate branches, encloses a descending ovule and is surrounded by a gamosepalous calyx. Around and below this are the imbricate bracts of the involucre. *Olmedia* consists of trees of tropical South America. Beside it is ranged *Antiaris* (fig. 119–121) inhabiting the warmest regions of Asia and Oceania, which differs only in its ovary being inferior instead of superior, and in the parts of its female calyx being independent instead of being united to a variable extent below. The flowers are monœcious. *Pseudolmedia*, growing in the same countries as *Olmedia*, has the inferior ovary of *Antiaris*, with a descending or laterally attached ovule, and a lateral style emerging from an apical orifice in the floral envelope. The male flowers are destitute of perianth aud represented by a variable number of stamens inserted within the imbricate bracts of the involucre.

In most genera of *Olmedieæ*, the female flowers are numerous upon each capitule on which they are arranged in glomerules. In that only is *Castilloa* (fig. 122), a caoutchouc tree of central America, distinguished from *Pseudolmedia*. It has otherwise the aperianthous male flowers, the inferior ovary and the style with two stigmatiferous divisions of *Pseudolmedia*. *Helicostylis*, a genus from northern Brazil and Guyana, has the inflorescence and female flowers of *Castilloa*, but tetrandrous male flowers and a calyx of four sepals like *Antiaris*. This genus derives its name from the stylary branches being much spirally twisted; a tendency existing but in a much less degree in *Castilloa*. Not only is the ovary inferior relatively to the perianth in the two preceding genera, but it is also adherent on one side to the cavities from which the receptacle of the inflorescence grows, like that of *Artocarpus*. The same is the case in *Noyera*, a tree of Guyana, the male flower of which is unknown, and the style proceeds from a simple apical opening in the epigynous perianth, as in *Pseudolmedia*. In *Naucleopsis*, on the contrary, the inferior ovary is entirely buried in the receptacular tissue itself, to which it adheres in every part. It is a tree of northern Brazil. *Maquira* and *Perebea*, which belong to Guyana and Columbia, and have tetramerous and perianthous male flowers, differ from all the preceding genera in that their female flowers are simply placed upon the surface of the common receptacle, without laterally adhering to it. They have a female calyx with four divisions more or less deep, relative to which the ovary is inferior in *Maquira* and superior in *Perebea*. The former are therefore here the analogues of *Olmedia*, whilst the latter nearly correspond to *Pseudolmedia* and *Antiaris*.

Castilloa elastica.

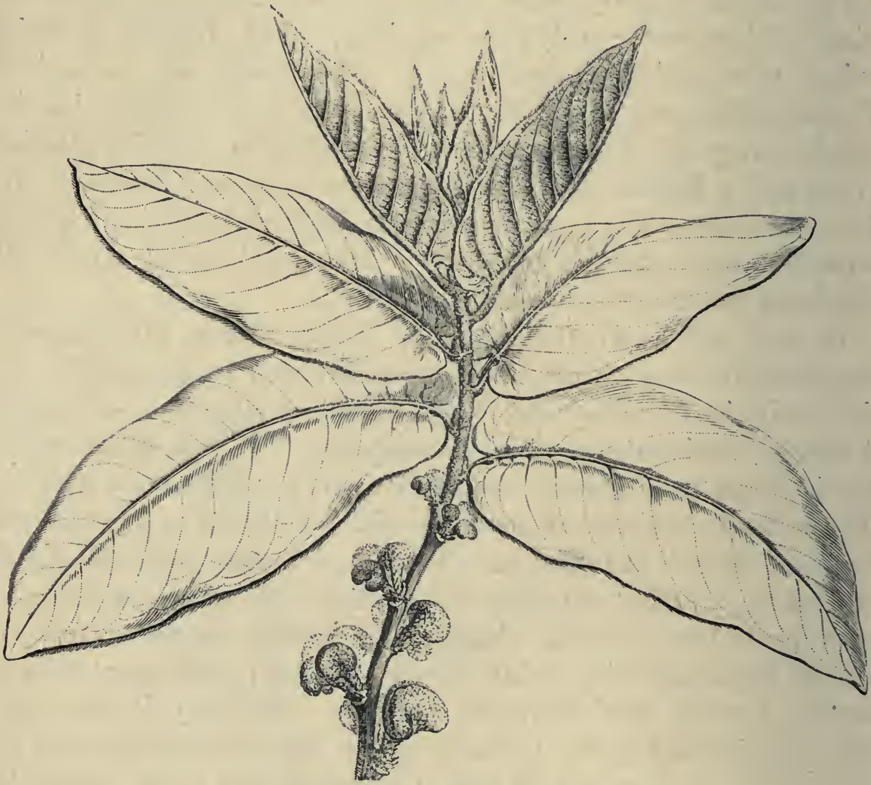

Fig. 122. Floriferous branch ($\frac{1}{2}$).

Now let there be, in a concave receptacle like that of the *Antiaris*, a female flower the ovary of which occupies the central cavity, and on the thickened margin of the receptacle let there be grouped glomerules of male flowers, inserted perigynously in relation to the gynæcium, and we shall have an inflorescence much resembling the flower of the Rose, with this difference that the stamens are replaced by male inflorescences. This happens in a small group to which the name of *Brosimeæ* has been given. Take, for example *Lanessania* (fig. 123), a tree of northern Brazil. The receptacle of its inflorescence has the form of a reversed pyramid, growing from a long central cavity in the form of a deep pit. The ovary, imbedded in it, is otherwise organized like that of *Olmedia*, and the two long branches of the style which surmounts it emerge from the opening corresponding to the centre of the base of the pyramid. The entire surface of this base bears glomerules of male flowers, formed of a gamosepalous calyx and two or three stamens. Around the male flowers is found a crown of small bracts forming an involucre; they are inserted on the circumference of the pyramidal base. Others are scattered in small number over its convex surface; others again are collected in a second involucre towards the summit of the pyramid—that is, above the axillary peduncle which supports it. In *Scyphosyce*, a shrub of western tropical Africa, the relative disposition of the various elements of the androgynous inflorescence is fundamentally the same, but the form of the parts is very different. The common receptacular cup is wider and less deep. The central female flower is consequently free, removed from the coats of the receptacle. Near the margin of the latter are also inserted perigynously the male flowers, furnished equally with a gamosepalous calyx. They have only one stamen, and the bracts of the involucre which are outside of them are highly developed and completely cover them by imbrication in the bud. The female flower is also surrounded by its own calyx.

Lanessania turbinata.

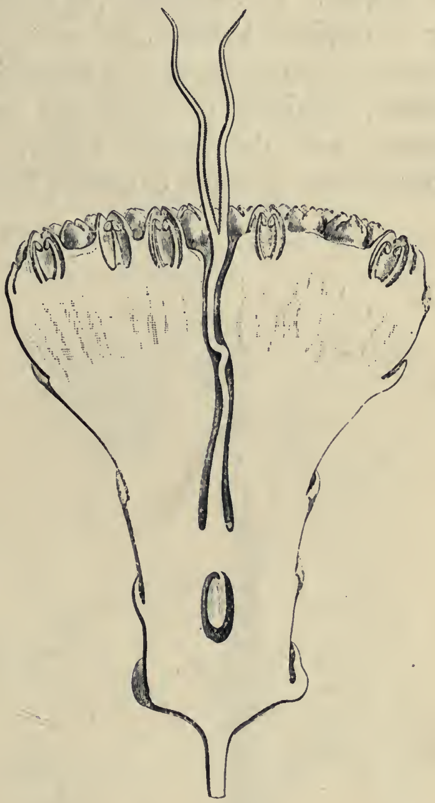

Fig. 123. Long. sect. of inflorescence ($\frac{6}{1}$).

Bosqueia, a shrub of Madagascar and the eastern coast of Africa, has the gynæcium of *Lanessania*, with the involucre and monandrous flowers of *Scyphosyce*; but the monandrous flowers are not surrounded by a calyx, and the common receptacle of the inflorescence has an upper surface more or less oblique, according to the age of the flowers. In *Piratinera* (of which *Brosimum* forms part) belonging to tropical America, the receptacle takes the form of a small sphere the entire surface of which is covered with monandrous male flowers, destitute of calyx and separated by bracts with peltate summit, and the female flower, most frequently single in the inflorescence, is found imbedded in the interior of the sphere.

Ficus Carica.

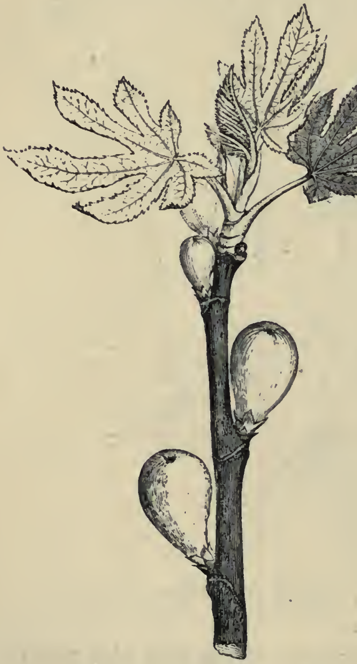

Fig. 124. Foliaceous and floriferous branch ($\frac{1}{3}$).

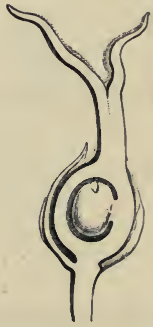

Fig. 125. Long. sect. of female flower ($\frac{8}{1}$).

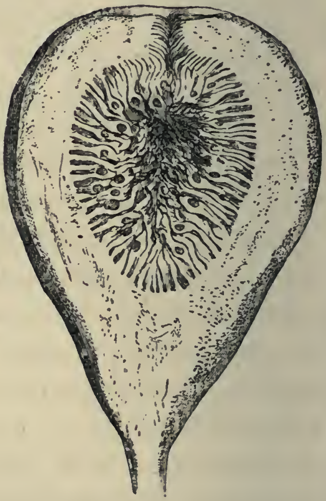

Fig. 126. Long. sect. of compound fruit.

With a receptacle in form of a sac, like that of *Lanessania* and the neighbouring genera, the Figs (*Ficus*) have given their name to a distinct group (*Ficeæ*), because this receptacular pouch, with orifice generally very narrow, and surrounded by a small involucre, encloses female flowers in great number instead of a single one, with or without male flowers above them. All are likewise disposed in glomerules on the interior surface of the common receptacle (fig. 124–126). There are Figs in all parts of the world, but especially in the tropical regions. *Sparattosyce*, trees of New Caledonia, derive their name from their common floral receptacle being finally divided and open, which is not the case in the Figs; and from their female flowers, situated upon separate inflorescences, having a style emerging from the apical opening of the receptacle, that of the Figs remaining enclosed.

In the *Soroceeæ*, the flowers are in clusters or catkins composed of cymes or glomerules (as in the inflorescence of most *Moreæ*). The *Soroceæ* proper, shrubs of South America, have pedicellate flowers of both sexes. In *Pseudosorocea*, plants of the same regions, they are sessile and disposed along the two margins of an elongate and flattened axis, resembling a spike, but which, like that of many *Moreæ*, has one or two faces without flowers and often reduced, at adult age, to simple longitudinal ridges. Finally, in *Sahagunia*, likewise American, and one species inhabiting Mexico, not only does the male catkin present this peculiarity, but the male flowers, instead of being, as in the preceding genera, furnished with sepals and an equal number of superposed stamens, are represented only by bare stamens, disposed in great number and without apparent order on the common receptacle and intermixed with a variable number of bracts.

In one and the same genus, *Pseudolmedia*, according to the species, we have seen the ovule inserted more or less high on the wall of the ovarian cell, and also by an umbilicum more or less elongate; so that this ovule was in one case descending, and in another attached laterally to the ovary. It is this last arrangement which is presented in *Pourouma* (fig. 127), trees of tropical America, which, by this character, serve as intermediaries between the genera which precede and those which follow, and of which the group *Conocephaleæ* has been formed. *Pourouma* has a free ovary, enclosed in a sac, through an opening in the summit of which passes the style afterwards dilated to a stigmatiferous head. The flowers are grouped in compound cymes with axes sometimes very short. In *Conocephalus* (fig. 128),

Pourouma mollis.

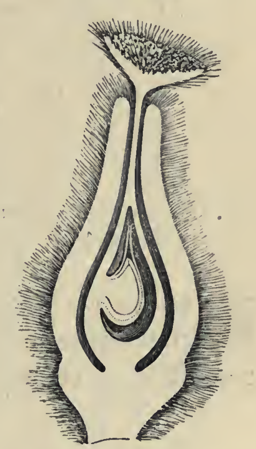

Fig. 127. Long. sect. of female flower ($\frac{4}{1}$).

which belong to tropical Asia and Oceania, besides the ovule being erect and orthotropous, the flowers of both sexes are borne on spherical receptacles or nearly so, and the female calyx is widely cleft above into four lobes. *Coussapoa*, inhabiting tropical America, has the capituliform inflorescence of *Conocephalus*, with its basilar and erect ovule, and the female perianth of *Pourouma*, provided at the summit with an opening which gives passage to the style. In *Cecropia*, beautiful American trees, with peltate-digitate leaves, the glomerules of flowers of both sexes are borne on long cylindrical and spikelike receptacles. *Musanga* has also digitate leaves; but the male inflorescences are little spheres, like those of *Conocephalus*, and the female have a large obovate or piriform receptacle. The gamosepalous calyx, in both sexes, has a circular orifice at the summit, and the male flowers are monandrous. *Musanga* inhabits tropical western Africa. This is also the native country of *Myrianthus* and *Dicranostachys*, which have simple pinnate or digitate leaves. The former has the same female inflorescence as *Musanga*, whilst the latter has female flowers disposed in stars on a small few-flowered capitule. Both have simple styles, and numerous small male flowers, arranged in close glomerules on the much-branched and nearly cylindrical axes of an inflorescence resembling a compound spike.

Conocephalus suaveolens.

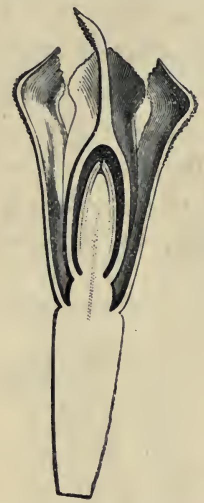

Fig. 128. Long. sect. of female flower ($\frac{4}{1}$).

IV. HEMP SERIES.

In the *Hemp*[1] (fig. 129–136), the flowers are diœcious, regular and apetalous. The male flower is composed of five sepals, quincuncially imbricate in the bud and inserted on a small convex receptacle which also bears five stamens superposed to the sepals, each formed of a free erect filament and a bilocular anther, primarily introrse,[1] dehiscing by two longitudinal clefts. The female flower is composed of a small gamosepalous calyx,[2] in the form of a truncated membranous cup, and of a superior gynæcium. Its sessile ovary has

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[1] *Cannabis* T. *Inst.* 535, t. 309.—L. *Gen.* 304. —Adans. *Fam. des Pl.* ii. 376.—J. *Gen.* 404.—Gærtn. *Fruct.* t. 75.—Lamk. *Dict.* i. 694; Suppl. ii. 191; *Ill.* t. 814.—Schkuhr, *Handb.* t. 325.—Nees, *Ic. Fl. Germ.* ii. 30.—Schleid. *Wiegm. Arch.* v. *Beitr.* 40, t. 2, fig. 19.—Spach, *Suit. à Buffon*, xi. 31, t. 133.—Endl. *Gen.* n 1890.—Payer, *Organog.* 281, t. 61; *Fam. Nat.* 169.—Schnizl. *Icon.* t. 95.—Gasparr. *S. Canape*, in *Mem. Bot.* t. 1–3.—A. DC. *Prodr.* xvi. p. i. 30.

Cannabis sativa.

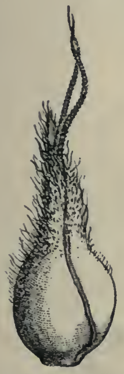

Fig. 132. Female flower enclosed in bract.

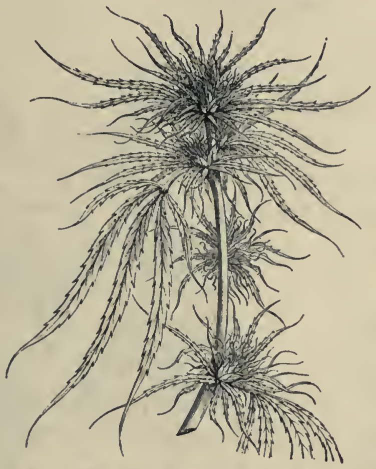

Fig. 131. Female floriferous branch.

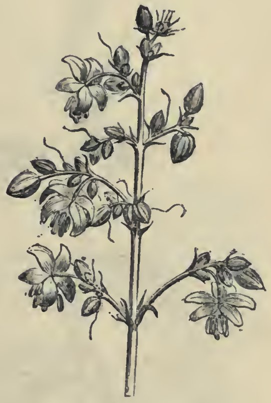

Fig. 129. Male inflorescence.

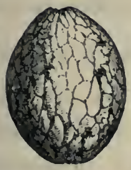

Fig. 135. Induviate fruit ($\frac{4}{1}$)

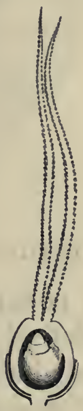

Fig. 134. Long. sect. of female flower.

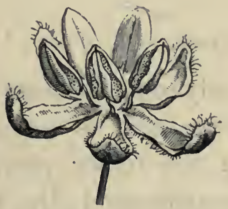

Fig. 130. Male flower ($\frac{3}{1}$)

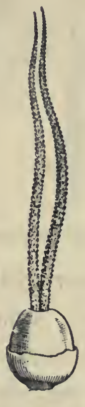

Fig. 133. Female flower ($\frac{6}{1}$).

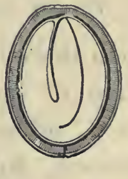

Fig. 136. Long. sect. of fruit.

primarily two cells of which only one remains at maturity, and it is surmounted by two stylary branches, articulate at their base, and clothed with stigmatic papillæ. On the side of the ovarian cell is a placenta bearing a single descending, anatropous ovule, with micropyle directed upwards and outwards.[1] The fruit is an achene, the descending seed of which encloses a fleshy embryo, without albumen; the incumbent radicle is folded upon the cotyledons and its summit turned upwards. The Hemps are annual herbs, of which there is in reality only one species;[2] it is supposed to be a native of central Asia. Its stem is erect, clothed with opposite leaves, often alternate in the upper part, palminerved, 7–9-sect, scabrous, with petiole accompanied by two free and persistent stipules. The whole plant has a strong odour and contains an aqueous juice. The male flowers are in axillary and terminal clusters of compound cymes which become in part uniparous and are partially destitute of bracts. The female flowers are also in

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[1] The lines of dehiscence may become lateral, then slightly extrorse. The pollen is "spherical; three small umbilica surrounded by a large halo; external membrane transparent" (H. MOHL, *Ann. Sc. Nat.* sér. 2, iii. 313).

[2] It is often little developed, and it has been admitted that it may even be abortive.

Humulus Lupulus.

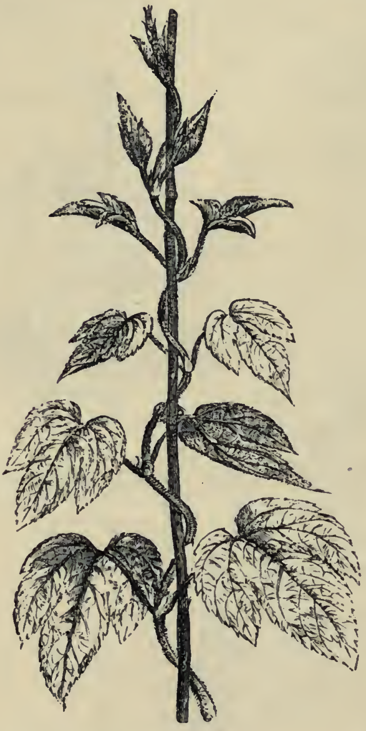

Fig. 137. Volubile foliaceous branch.

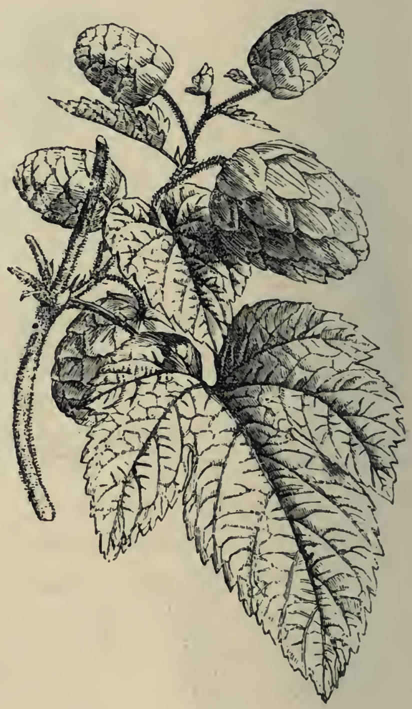

Fig. 141. Fructiferous branch.

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[1] With double envelope.

[2] *C. sativa* L. *Spec.* 1457.—Reichb. *Ic. Fl. Germ.* t. 655.—Blackw. *Herb.* t. 322.—Gren. et Godr. *Fl. de Fr.* iii. 112.—*C. indica* Lamk. *Dict* i. 695, n. 2.—*C. chinensis* Del. *Cat. Hort. Monsp.* (1849).—*Polygonum viridiflorum* Poir. *Dict.* vi. 140 (ex Meissn.).—*Kalengi* Rheed. *Hort. Malab.* x. t. 60.

cymes or glomerules, and are situated in the axils of the foliaceous bracts. Each is accompanied by a bracteole, a small gamosepalous calyx and a unilocular and uniovulate ovary, surmounted by two equal branches of a long developed, oval-lanceolate style, veluto-glandular without and considered as formed of two connate stipules. It persists around the fruit which it totally envelopes and extends even a little beyond.

Humulus Lupulus.

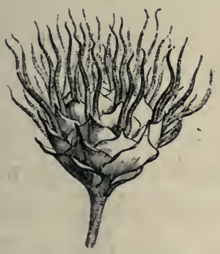

Fig. 138. Female inflorescence ($\frac{4}{1}$).

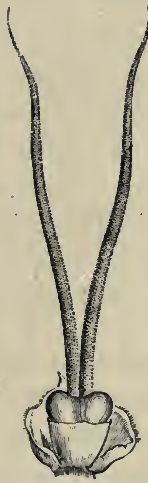

Fig. 139. Female flower ($\frac{8}{1}$).

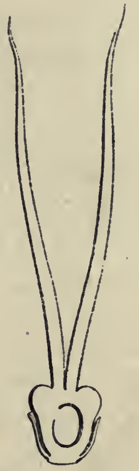

Fig. 140. Long. sect. of female flower.

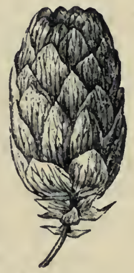

Fig. 142. Compound fruit (cone).

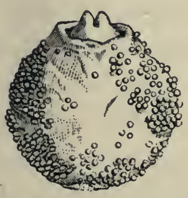

Fig. 144. Achene and induvium ($\frac{4}{1}$).

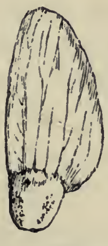

Fig. 143. Winged induvium.

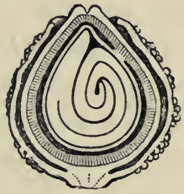

Fig. 145. Long. sect. of induviate achene.

The *Hops*[1] (fig. 137–145) are also diœcious, and their male and female flowers are constructed like those of the Hemp. But their staminal filaments, instead of remaining erect, become very slender and pendent, and the female floral bracts, as also the bracteoles, considered as connate stipules, enveloping the flower, are more or less elongate around the fruit (fig. 143). The latter (fig. 144, 145) is an achene[1] of which the descending seed contains under its coats an embryo destitute of albumen, with radicle ascending and incumbent upon the cotyledons highly developed and spirally rolled one upon the other (fig. 145). The two or three species of this genus known[2] are herbaceous evergreen plants, with annual and volubile branches, opposite 3–7-fid leaves, accompanied by interpetiolate and connate stipules. All the parts are rough, scabrous, odorous. The male flowers are in rough clusters of cymes, and the female flowers as well as the fruit (cones) collected in pedunculate capitules, with numerous bracts closely imbricate, in the axil of which the flowers are germinated (fig. 138, 142). The Hop, now cultivated in both worlds,[3] is a native of Europe and temperate Asia.

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[1] *Humulus* L. *Gen.* 304.—J. *Gen.* 404.—Lamk. *Dict.* iii. 138; *Ill.* t. 815.—Schkuhr.—*Handb.* t. 326.—Nees, *Ic. Fl. Germ.* ii. 31.—Schleid. *Wiegm. Arch.* v. 229, t. 7; *Beitr.* t. 2, fig. 20. – Spach, *Suit. à Buffon*, xi. 33.—Endl. *Gen.* n. 1891.—Lindl. *Veg. Kingd.* 265, fig. 179.—Payer, *Fam. Nat.* 169.—A. DC. *Prodr.* xvi. p. i. 29.—*Lupulus* T. *Inst.* 535, t. 309.—Gærtn. *Fruct.* t. 75.

The family of *Ulmaceæ* is of modern creation: B.-MIRBEL[4] distinguished it in 1815. Those genera comprised in it which were known to ADANSON,[5] such as *Cannabis*, *Morus*, *Ficus*, *Dorstenia*, *Cecropia* (*Ambaiba*), *Trophis* (*Bucephalon*), *Celtis* and *Ulmus*, were placed by him in section III. of his family of *Castaneae*, with *Urtica*, that is, in the group of *Scabrideæ* of LINNÆUS,[6] plants to which JUSSIEU[7] afterwards gave the name *Urticæ*. R. BROWN,[8] in 1818, separated from the *Urticeæ* a group of *Artocarpeæ*, and was therein followed by BARTLING and by DUMORTIER[9] who detached from the *Urticeæ* the families *Ficineæ*, *Cannabineæ*, *Humulineæ*, etc. ENDLICHER,[10] in 1833, and, after him, MEISSNER[11] distinguished from them an Order *Moreæ*. All these groups were differentiated from the *Urticaceæ*, either by the organisation of the gynæcium, in which some character, generally easily verified, varied, as the mode of placentation, the direction of the ovules, their anatropy, or the number of styles, or by the mode of insertion of the stipules or the presence of a milky juice. Later a reaction set in against this extreme division which the *Prodromus* of DE CANDOLLE[1] still completely maintains. The principal leaders of this movement were PAYER[2] and SEEMANN[3] who reunited, under the name of *Artocarpeæ* nearly all the genera we have just passed in review, but who have recently been surpassed in this respect by BENTHAM[4] with whom the limits of the *Urticeæ* have returned very nearly to what they were in the time of JUSSIEU. In 1847 TRECUL[5] published an important memoir on the family of *Artocarpeæ*, in which he enumerates (with the description of a hundred species) all the genera, to the number of forty, recognised in it;[6] he adds the six genera *Cudrania*, *Dicranostachys*, *Helicostylis*, *Noyera*, *Pseudolmedia*, *Treculia* and the new genus of *Moreæ*, *Plecospermum*. J. E. PLANCHON, in 1848[7] and in 1873,[8] made a monographic study of the *Ulmaceæ*, among which, to the genera known before his labours, *Ulmus*, *Celtis*, *Trema* (*Sponia*), *Gironniera*, *Planera*, *Abelicea* (*Zelkova*) and *Parasponia*, he added the three types *Holoptelea*, *Aphananthe*, and *Chætacme*.[9] The genus *Ampelocera*, proposed by KLOTZSCH in 1843, ought, in our opinion, to be placed beside the preceding. In 1873 E. BUREAU wrote for the *Prodromus* a complete description of the group of the *Moreæ*[10] and a sketch of that of the *Artocarpeæ*.[11] In the former he describes twenty-four genera,[12] comprising about ninety species, and in the latter, he enumerates twenty-nine genera, with approximately seven hundred and fifty species. The new genera of *Moreæ* established by him in this work, and which we have retained, are six in number, viz.: *Diplocos*, *Phyllochlamys*, *Pseudo-*

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[1] Exterior to the putamen they have a small fleshy bed (fig. 145) which soon decays.

[2] L. *Spec.* 1457.—SM. *Engl. Bot.* t. 427.—BULL. *Herb.* t. 234.—REICHB. *Ic. Fl. Germ.* t. 656.—SCOP. *Fl. Carniol.* ii. 263 (*Cannabis*).—SIEB. et ZUCC. *Fl. Ap. Fam. Nat.* ii. 89.—SEEM. *Voy. Herald Bot.* 512, t. 98.—MIQ. *Ann. Mus. Lugd.-Bat.* ii. 133.—ASCHERS. *Fl. Brandeb.* 611.—GREN. et GODR. *Fl. de Fr.* iii. 112.

[3] The species described as American have doubtless been introduced, and *H. Americanus* is identical with *H. Lupulus* of Europe.—NUTT. *Journ. Acad. Sc. Philad.* ser. 2, i. 181.—TORR. *Emor. Rep.* 203.

[4] *Elém. de Phys. Vég. et de Bot.* 905.

[5] *Fam. des Plant.* ii. 376 (1763).

[6] *Meth. Nat. Phil. Bot.* (1770), 29.

[7] *Gen.* (1789), 400, Ord. 3.

[8] *Congo* 454; *Misc. Works* (ed. BENN.) i. 138.

[9] *Anal. des Fam.* (1829).

[10] *Prodr. Fl. Norfolk.* 40; *Gen.* 277, Ord. 92.

[11] *Plant. Vasc. Gen.* 261 (part.).

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[1] xvi. sect. i. 28 (*Cannabineæ*); xvii. 151 (*Ulmaceæ*), 211 (*Moraceæ*), 280 (*Artocarpaceæ*).

[2] *Fam. Nat.* 169, Fam. 76. He retained the *Ulmaceæ* as a distinct family.

[3] *Fl. Vit.* 145. He separated from this group the *Cannabineæ* which PAYER made only a section of the family *Artocarpeæ*.

[4] *Fl. Austral.* vi. 154.

[5] *Ann. Sc. Nat.* sér. 3, viii. 38, t. 1–6.

[6] In addition *Trophis*, rightly classed with the *Moreæ*, *Ficus*, now referred to the same group, and *Gynocephalum*, syn. of *Phytocrene*, and inseparable from the *Mappieæ*.

[7] *Ann. Sc. Nat.* sér. 3, x. 257.

[8] DC. *Prodr.* xvii. 151, Ord. 183.

[9] Not to speak of the genus *Hemiptelea*, by us reunited as a sub-genus to *Abelicea*.

[10] xvii. 211, Ord. 183 *bis*.

[11] *Loc. cit.* 280, Ord. 184.

[12] Of which one doubtful, *Calius* (BLANCO. *Fl. d. Filip.* 698), has monœcious flowers, the two sexes being united, it is said, in axillary or pedunculate fascicles or glomerules. The male flowers have four sepals and four stamens with inflexed filament inserted round a rudimentary gynæcium. The female flowers are those of the *Moreæ* in general, and the fruit is drupaceous. *C. lactescens* BLANCO is a tree common to the Philippines, which we have been unable, from the characters ascribed to it, to refer to any of the known genera of this group. (See p. 151, n. 1). Another doubtful genus is *Aspidanda* (HASSK. *Cat. Hort. Bogor.* ed. nov. 47; *Bot. Zeit.* (1856), 803; *Flora* (1857), 532, syn. of *Ryparia cæsia* BL., and which, according to MUELLER D'ARGOVIE (DC. *Prodr.* xv. p. ii. 1258), is perhaps an *Artocarpea*.

streblus, *Cardiogyne*, *Uromorus* and *Pseudomorus*. Among the *Artocarpeæ*, he established the new genera *Ogcodeia* and *Sparattosyce*, and admitted the genera posterior to the work of Trecul described by Miquel under the name of *Naucleopsis*, by Liebmann under that of *Sahagunia*, and by F. Allemao under those of *Soaresia* and *Acanthinophyllum*. He likewise reincludes in this group the older genera *Bayassa*, *Maquira* of Aublet, and *Myrianthus* of Palisot de Beauvois, with *Bosqueia* which remained long unpublished in the herbarium of Dupetit-Thouars, and which, in our opinion,[1] could not be separated from this family in which we have just[2] established the five genera *Parartocarpus*, *Helianthostylis*, *Scyphosyce*, *Lanessania*, and *Pseudosorocea*. Finally, the *Cannabineæ* comprising the two genera *Cannabis* and *Humulus*, with three or four species only, and the number of genera we preserve in the other series, being eleven for *Ulmeæ*, twenty for *Moreæ*, and thirty-two for *Artocarpeæ*, we arrive at a total for the entire family of *Ulmaceæ*, of sixty-five genera comprising about a thousand species.

They are distributed over a considerable extent of the globe. *Celtis* and *Ficus*, for example, belong to all parts of the world; *Trema* and *Morus* to most warm regions; *Ulmus* to all parts of the northern hemisphere. Three other genera, *Dorstenia*, *Trymatococcus*, and *Humulus*,[3] are common to both worlds. To America belong the twenty-three genera *Planera*, *Ampelocera*, *Maclura* (?), *Trophis*, *Cecropia*, *Coussapoa*, *Pourouma*, *Bagassa*, *Olmedia*, *Pseudolmedia*, *Acanthinophyllum*, *Noyera*, *Perebea*, *Maquira*, *Castilloa*, *Naucleopsis*, *Helicostylis*, *Helianthostylis*, *Lanessania*, *Piratinera*, *Sahagunia*, *Sorocea*, and *Pseudosorocea*. The remaining thirty-five belong to the old world. Some of them are found only in Africa; *Chætacme* grows at the Cape of Good Hope; *Maillardia*, *Cardiogyne*, *Ampalis*, *Bosqueia*, belong to the continent or eastern isles; *Scyphosyce*, *Treculia*, *Musanga*, *Myrianthus*, and *Dicranostachys*, are observed only on the tropical western coast. The other types are most numerous in Tropical Asia and Australia on the one hand, and on the other in tropical South America. To the former belong exclusively *Gironniera*, *Parasponia*, *Aphananthe*, *Holoptelea*, *Diplocos*, *Phyllochlamys*, *Streblus*,

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[1] *Adansonia*, iii. 335, t. 10; viii. 72.

[2] *Adansonia*, xi (1875), 293–299.

[3] And *Maclura*, doubtfully *M.*? *excelsa* Bur. *Prodr.* 231, n. 4), a species of tropical western Asia, belonging probably to another genus, a neighbour (?) of *Ampalis*.

Pseudostreblus, *Caturus*, *Plecospermum*, *Uromorus*, *Pseudomorus*, *Fatoua*, *Sloetia*, *Conocephalus*, *Cudrania*, *Artocarpus*, *Parartocarpus*, *Antiaris* and *Sparattosyce*, that is, twenty genera. Brazil possesses an equal number of which two-thirds are peculiar to it. *Ficus*, the only genus observed spontaneous in all parts of the world, is rare in Europe and exists only in the south where it is represented by a single species, *F. Carica*.[1] In Africa it extends to the Cape, and in Asia ascends to Japan. In the two Americas its geographical range is over 60 degrees, and in the Old World nearly 80. The other *Artocarpeæ* are confined to the more tropical regions. *Cudrania* and *Conocephalus* extend to the Asiatic temperate zone, and in the warmest parts of Mexico are found, besides Figs, a *Sahagunia* and a *Cecropia*. The *Moreæ* extend further both north and south, for *Broussonetia* reaches the north of China; *Maclura* inhabits the United States, and both endure the open climate of our country, as also many Mulberries. *Paratrophis heterophylla* is a native of New Zealand. *Morus alba* grows wild in Mongolia, and *M. rubra* as far as Canada. The genera of this family which include the wildest species belong to the *Ulmeæ* series. There are species of *Celtis* as far as the north of China and Japan.[2] The Elms have the most northern range whether in America[3] or in Asia and Europe.[4] In this last part of the world, besides Figs, we meet with the genera *Ulmus*, *Celtis*, *Abelicea*, and *Humulus* in the wild state, and introduced, the genera *Morus*, *Broussonetia*, *Maclura*, *Cudrania*, *Planera*, and *Cannabis* thought to be of Asiatic origin.[5]

The series which we admit in this family are distinguished from one another by the following characters:

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[1] Spontaneously in Italy, according to GASPARRINI (*Ric. s. Caprif. e Fico*, Napoli (1845), 65), who divides it into several species, adopted by MIQUEL (*Hook. Lond. Journ.* (1848), 222). But M. A. DE CANDOLLE (*Géogr. Bot. Rais.* 919) believes these Figs to be natives of western Asia. *Caprificus*, or the wild Fig, the inflorescences of which are fixed on the branches of the cultivated Fig, either to fecundate the latter or to give the *Cynips*, which, by pricking the fig, would hasten, it is supposed, its divelopment, would be also of western origin.

[2] *Celtis japonica* is said to have borne in Europe 20 degrees of cold. *C. canina* grows in the State of New York, as well as *C. crassifolia*. This genus is also represented in La Plata by *Momisia*.

[3] Where *Ulmus americana* grows spontaneously in Canada to 48° 20′ lat. N.

[4] *U. pedunculata* is found in Sweden and Russia higher than *U. campestris*. The latter grows in Scotland. *U. pumila* inhabits the transbaical region of Siberia. *U. Montana* is found in Sweden, in Scotland, and as far as the river Amour; *U. Fulva*, in Canada.

[5] A. DC. *Géogr. Bot. Rais.* 833, 986.

I. Ulmeæ.[1] — Flowers polygamo-diœcious; more rarely hermaphrodite, isostemonous, or more rarely 2–3-plostemonous. Staminal filaments straight or incurved in prefloration. Ovule descending. Fruit dry and often winged (true *Ulmeæ*), or drupaceous, without wings (*Celtideæ*).—Trees or shrubs, with juice not milky, distichous leaves, accompanied by lateral stipules either intra-axillary and independent or united, flowers in loose or contracted cymes.—11 genera.

II. Moreæ.[2]—Flowers monœcious or diœcious, ordinarily tetramerous. Stamens in number less than or equal to the sepals, filaments inflexed in prefloration and elastically straightened at the period of anthesis, anthers introrse after anthesis. Ovule descending, anatropous or campylotropous. Fruit generally drupaceous, indehiscent.—Trees or shrubs, rarely evergreen herbs,[3] juice generally[4] milky or opaline, leaves alternate, often distichous, stipules lateral persistent or caducous, leaving on the branches transverse but rarely annular scars. Inflorescence mixed, formed of cymes or oftener glomerules grouped on a spike-like capituliform rarely racemiform receptacle.—20 genera.

III. Artocarpeæ.[5]—Flowers monœcious or diœcious, similar to those of the *Moreæ*, except that the staminal filaments are straight in prefloration and at every age. Ovule descending or more rarely (*Conocephaleæ*) ascending (and in this case completely or incompletely orthotropous), with micropyle always superior.—Trees or shrubs, with juice generally milky or opaline, leaves alternate rarely opposite convolute in estivation, stipules ordinarily amplexicaul, leaving annular scars on the axes.—32 genera.

IV. Cannabineæ.[6]—Flowers diœcious, isostemonous. Staminal filaments short and straight. Female calyx gamophyllous, cupuliform. Ovule campylotropous. Fruit dry induviate and indehiscent. Seeds without albumen, embryo recurved.—Odorous herbs, annual and erect or evergreen and climbing, with aqueous juice, leaves opposite (at least in the lower part of the stem), scabrous, palminerved, often lobate, stipules persistent, inflorescence in cymes.—2 genera.

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[1] *Ulmaceæ* Mirb. *Elém.* (1815), 905.—Lindl. *Veg. Kingd.* (1846), 580, Ord. 221.—Endl. *Gen.* 275, Ord. 90.—Pl. *Prodr.* xvii. 151, Ord. 183.—*Celtideæ* L. C. Rich. ex Gaudich. *Voy. Freycin. Bot.* (1826), 507 (this name, proposed by L. C. Richard, would doubtless have priority, but appears not to have been published by him).—Endl. *loc. cit.* 276, Ord. 91.—Lindl. *loc. cit.* 580, Ord. 221.

[2] *Moreæ* Meissn. *Gen.* 261 (part.).— Endl. *Gen.* 277, Ord. 92 (part.).—*Moraceæ* Lindl. *Veg. Kingd.* 266, Ord. 87 (part.).—Bur. *Prodr.* xvii. 211, Ord. 183 *bis.*—*Broussonetieæ*, *Chlorophoreæ*, *Ficeæ*, *Dorstenieæ* Gaudich. *Voy. Freycin. Bot.* 509.

[3] *Fatoua* only such.

[4] But not constantly.

[5] R. Br. *Congo* (1818).—Lindl. *Veg. Kingd.* 269, Ord. 88.—Endl. *Gen.* 277, Ord. 92.—Tréc. *Ann. Sc. Nat.* sér. 3, viii. 38.—*Artocarpaceæ* Bur. *Prodr.* xvii. 280, Ord. 184.

[6] Bl. *Bijdr.* 515 (1825).—Dumort. *Anal.* 17. —Endl. *Gen.* 286, Ord. 95.—A. DC. *Prodr.* xvi. sect. i. 28.—*Humulineæ* Dumort. *loc. cit.*—*Lupulaceæ* Rasp. *Phys.* ii. 495.—*Cannabinaccæ* Lindl. *Veg. Kingd.* 265, Ord. 86. —*Cannabisaccæ* Ser. *Descr. Mûr.* 188.—*Cannabaceæ* Al. Br. *Aschers Fl. Brandeb.* 611; *Enl.* 58.

A family thus constituted, "by concatenation," has manifold affinities. LINDLEY has placed the *Ulmeæ* in his Alliance of *Rhamnales*, between the *Aquilarieæ*, which belong to the *Thymelaceæ*, and the *Chailletiæ*, which we include in the *Euphorbiaceæ*. We are not unmindful of their affinity to the *Urticeæ*. Now, although the *Artocarpeæ* and the *Moreæ* have been more or less widely separated from the *Urticeæ* on account of the constitution of their dicarpellar gynæcium with ovules oftener descending and anatropous, and although we ourselves have formerly admitted this separation, the study of a large number of genera of the small group of *Conocephaleæ*, in which the ovule is more or less distinctly ascending and orthotropous, we are convinced that this disjunction cannot be maintained and that the opinion of Mr. BENTHAM, restoring to the older Family of *Urticeæ* its unity and integrity, ought now to be fully adopted. We perhaps go still further than he does in leaving the *Ulmeæ* and *Artocarpeæ* in one and the same natural group; but the *Celtideæ*, on the one hand, could not be disjoined from the *Elms*, the fruit of *Planereæ* being intermediate between the drupes of *Celtis* and the samaræ of *Ulmus*; and, on the other hand, they could not be separated from *Moreæ* and *Artocarpeæ* by any truly absolute character, neither by the nature of their juice, nor by the characters of their stipules, stamens, gynæcium and fruit; and if the differences which have been put forward for this purpose really exist, there is not one which, in every case, can be considered constant. On the other hand, the family we are now studying approaches, as we shall presently see, very near to the *Castaneaceæ* and, consequently, to the *Hamamelideæ* and *Plataneæ*.

USES.—The milky or opaline juice found in a great number of *Artocarpeæ* give them very characteristic properties,[1] analogous to those of the *Euphorbiaceæ* with similar properties. Their latex[1] is rich, either in caoutchouc, which is extracted for industrial purposes, or in a deleterious principle which renders these plants extremely dangerous. The most celebrated of the latter class is unquestionably *Antiaris toxicaria*[2] (fig. 119–121), a terrible poison with which the natives of Java formerly rubbed their weapons of war and chase, and the inoculation of which was said to be mortal. Moreover, contact with or even the neighbourhood of this tree was, according to report, fatal to man. Fugitive slaves perished under its branches in the forests where they took refuge, and the ground was strewed with corpses in the valleys of death where this terrible tree grew, under which the birds could not fly without perishing. Rumphius, then Leschenault, have made us better acquainted with what is true in all these traditions. The latter received the milky juice which flows from incisions in this tree upon different parts of the body without inconvenience; but he also has seen accidents produced by contact of the latex with the skin or the eyes. Many of the Javans who cut the tree experience pains, nausea, vomiting, and vertigo.[3] The action of this juice is more energetic when inoculated than when taken internally, and, in the latter case, it does not act with the same intensity on man as on other animals. We are assured that animals killed by this poison may be eaten without inconvenience.

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[1] ENDL. *Enchirid.* 168.—LINDL. *Veg. Kingd.* ii. 320. — ROSENTH. *Syn. Pl. Diaphor.* 196, 270; *Fl. Med.* 301.—GUIB. *Drog. Simpl.* éd. 6. 1108.

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[1] The reservoirs of this juice have been studied occasionally by authors who have examined this family anatomically, the principal of whom are:—Miq. *Observ. sur le Canal. Médull. et les Diaphr. du Tronc de* Cecropia *Bull. Sc. Phys. Néerland.* (1838), 29–31, 168-172, *Mart. Fl. Bras. Urtic.* 140).—C. H. Schultz, *D. Cyklose* (*Nov. Act. Nat. Cur.* (1841), xviii. Suppl. ii. t. 13.—Karst. *Nov. Act.* (1854), xxiv. 79.—*Morus*; Gaudich. *Voy. Bon. Bot.* Atl. t. 132, f. 14, 15. M. David attributes to the reservoirs of the latex of the *Moreæ* the same origin and the same constitution as to those of the *Euphorbiaceæ* (see vol. v. 159, note 5).—The same applies to *Ficus Carica*: Meyen, *Phytot.* (1830), t. 10. f. 5, 6;—*F. elastica*, Link. *Ic. Anat. Bot.* (1837), fasc. ii. xiv. 1–;—Duchtre, *Elém.* fig 25, 26. Trécul has marked as an exception (*Compt. Rend.* lxvi. 575) *Conocephalus naucleiflorus*, which does "not enclose vessels with a milky juice, but cellules of gum in the youngest part of the branches and lacunes or canals full of gum in the older parts."

[2] Leschen. *Ann. Mus.* xvi. 476, t. 22.—Bl. *Rumphia*, ii. 56, t. 22, 23.—Lindl. *Fl. Med.* 301. —H. Bn. *Dict. Encycl. Sc. Méd.* v. 306.—*Arbor toxicaria* Rumph. *Herb. Amboin.* ii. 263, t. 87 (*Antiar*, *Antsjar*, *Upas-Antiar*, *Pohon-Upas*, *Ipo*, *Hypo*).

[3] On the effect of Antiar, see Rai, *Hist. Pl. App.* iii. 87.—C. Æjmel (præsid. Thunb.), *Arbor toxicaria Macassariensis.* Upsal (1788). —Försch. *Mél. Litt. étr.* i. 63.—R.-Del. *Sur. les Eff. d'un Poison de Java.* Paris (1809).—Magend. *Exam. de l'Action. de qq. Vegét.* Paris (1809).—Orfila, *Toxicolog.* ii. 1.—Mart. *Ueb. den Macassar Giftbaum.* Erlang. (1792).—Mér. et Del. *Dict. Mat. Méd.* i. 333.—Guib. *Drog. Simpl.* éd. 6, ii. 327. Antiar has been analysed by Pelletier and Caventou (*Ann. Chim. et Phys.* xxvi. 44). They found, among others, a bitter substance including the venomous principle which contains perhaps, according to them, an alcaloid. M. Mulder has named it *antiarine* ($C^{28}H^{20}O^{10}$).

The juice of *Antiaris toxicaria* has been proposed as a curative; it is an energetic evacuant, but probably very dangerous. Beside this species some are mentioned as not injurious, as *A. innoxia*[1] and *A. Bennetti*,[2] which have various uses in the Viti isles, principally to prepare and dye the barks of which the natives make their coarse garments. In Ceylon, *A. saccidora*[3] is employed to make tissues and especially sacks, the foundation of which is a thin round of wood the only portion preserved of an entire log chosen of the height desired for the sack; the coats of this are formed of the cylinder of bark separated by beating and finally turned. Other *Artocarpeæ* have an acrid and caustic juice, notably *Piratinera spuria*,[4] of the Antilles and many species of *Artocarpus*. In singular contrast to these qualities of their latex, diametrically opposite qualities apparently are ascribed to that of the famous Cow tree of South America, *Piratinera utilis*,[5] which constitutes a true vegetable milk analogous, it is said, in its physical properties and alimentary value, to the milk of the cow;[6] although it has been more recently remarked that great abatement must be made from the value attributed to this aliment[7] which is obtained in abundance from incisions made in the bark. A thick and viscous gummy milk is also extracted from the bark of *Piratinera Alicastrum*,[8] a Jamaican species and its young leaves are employed in this country for feeding small cattle, but they are said to be injurious and aging. The seeds are edible, as are likewise those of the Cow tree, but they are roasted before being used. Those of *Musanga Smithii*,[1] a fine African tree, and of many species of *Artocarpus*, are equally edible. *A. integrifolia*[2] (fig. 115–118), in the wild state, has no other part useful. But culture has modified this species and still more *A. incisa*[3] (fig. 114), which is the Bread tree proper of Asia and tropical Oceania, in greatly reducing the volume of the fruit (with the seed they enclose), or even in making them entirely disappear, while the receptacle has assumed as much greater a development and is filled with a larger quantity of fecula. They are cut in slices and eaten fresh, boiled, roasted or grilled, but may be preserved after having been dried in the oven. In Otaheite scarcely any other species is now met with than the variety called "seedless," which grows abundantly also in the Friendly archipelago, the Sandwich Isles, New Hebrides, the Marianne and especially the Society islands. The fruit of three trees is said to be sufficient to nourish a man for a year. The flowers are used to prepare a sourish conserve. Dried, they form a sort of tinder. The thickened latex becomes birdlime for the use of the fowler. If to this we add that the wood, though but slightly resistent, may be employed in the construction of huts and that the bark and leaves serve for making mats, roofs, tissues, the statement that the Bread tree alone supplies all the material wants of this little-civilized people will be justified, and we shall understand the superstitious legends which claim a celestial origin for this precious vegetable. There are other species of *Artocarpus* useful to man, though less appreciated than the preceding. *A. heterophylla*,[4] an Indian species cultivated also in the Mascarene isles, has edible seeds; its root is astringent, as is also that of *A. integrifolia*, and is employed against diarrhœa and scabby affections. The juice of the fruit has been extolled for maladies of the eyes, and the wood and bark have served to prepare astringent gargles. The bark of *A. Lakoocha*[1] in India supplies an astringent medicine, as also that of *A. pubescens*,[2] an Indian species the bark of which is used as an antidiarrhœtic and administered in cases of pain, stiffness of limbs, contusions and tumours. In Java and Malabar *A. Blumei*[3] has the same reputation. From its buds and leaves is prepared an ointment which is applied to sores and hemorrhoidal tumours. Its fruit, prescribed against diarrhœa, contains an oil employed for culinary purposes. It is edible, as is also that of another Javan species, *A. Kertau*.[4] In Cochin China is eaten that of *A. Polyphema*,[5] and in the East Indies those of *A. imperialis* Roxb., *parvifolia* Wight, *elastica* Reinw., *longifolia* H. Cels, *lævis* Hassk. and *rigida* Bl.[6] The following are also reported as *Artocarpeæ* with edible fruit: in central America *Trophis* Americana L.; in Guyana, *Bagassa guianensis* Aubl.; in Brazil, *Pourouma acuminata*,[7] *bicolor*[8] and *cecropiæfolia*,[9] and many *Cecropiæ*. These are almost always astringent plants.[10] *C. peltata*[11] is much employed in the Antilles and central America for various purposes. Its caustic latex is used to destroy warts, corns and scabs. Its leaves and inner bark are very astringent, antidiarrhœtic and antigonorrhœtic. Of its hollow stems and branches the

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[1] Bl. *Rumphia* i. 172, t. 54.—*A. toxicaria* Hook. *Comp. to Bot. Mag.* t. 17 (not Lesch.).—*A. Dubia* Span. *Linnæa*, xv. 343.—*Arbor toxicaria fæmina* Rumph. *Herb. Amboin.* ii. 264.

[2] Seem. *Bonplandia*, ix. (1861), 259; x. 3. t. 7; *Fl. Vit.* 253, t. 72 (*Mavu ni Toga, Mami*).

[3] Dalz. *Hook. Journ.* iii. 232.—Wight, *Icon.* t. 1958.—*A. Zeylanica* Seem. *Bonplandia*, x. 4.—*Lepurandra saccidora* Nimmo, *Pl. Bomb.* 193. M. Thwaites (*Enum. Pl. Zeyl.* 427) believes this species identical with *A. innoxia* Bl.

[4] *Brossimum spurium* Sw. *Fl. Ind. Occ.* 20.—*Milk-wood*, P. Br. *Jam.* 369, n. 8.

[5] *Galactodendron utile* H. B. K. *Nov. Gen. et Spec.* vii. 163.—Endl. *Enchirid.* 168—Mér. et Del. *Dict. Mat. Méd.* iii. 321.—Rosenth. *Syn. Pl. Diaph.* 196.—Hook. *Bot. Mag.* t. 2723, 2724.—*Brosimum utile* Endl.—Lindl. *Veg. Kingd.* 270 (*Palo de Vaca, Sandi*).

[6] It contains 3·73 per cent. of fibrin and vegetable albumen (*Ann. de Chim. et Phys.* vii. 182). M. Boussingault has collected this vegetable milk and stated its alimentary qualities. Solly found that it contained 30·57 per cent. of *galactine*. It is said also to contain a fatty matter soluble at 40°, which, united with an albuminoid substance, salts, etc., would constitute a complete aliment. But there is great difference as to the proportions of these useful ingredients between observers who have treated of this juice. The fruit is said to be edible but viscous.

[7] Marcoy (*Tour du Monde*, xii. 167, 216) says that this milk, at first very sweet to the palate soon leaves in the mouth a bitter and disagreeable taste, that its daily use as an alimentary substance would soon produce serious disorders in the animal economy, and that the natives taste it partly from want of occupation, partly to assuage their thirst, partly to show the curious that a small dose of this liquid may be taken without danger; but that they do not make their nourishment of it; that they use it mixed with soot to calk their vessels, also as an astringent in cases of tenesmus and dysentery.

[8] *Brosimum Alicastrum* Sw. *Fl. Ind. Occ.* i. 17, t. 1, fig. 1.—Tuss. *Journ. Bot.* i. 202, t. 7.—Rosenth. *op. cit.* 196.—*Alicastrum arboreum fol. Ovat. Alt. Fruct. Solitariis* P. Br. *Jam.* 372 (*Bread Nut*).

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[1] R. Br. *Congo*, 453.

[2] L. f. *Suppl.* 61.—Wight. *Icon.* t. 6, 8.—Hook. *Bot. Mag.* t. 2833, 6834.—Tréc. *Ann. Sc. Nat.* sér. 3, viii. 115.—Mér. et Del. *Dict. Mat. Méd.* i. 454.—Rosenth. *op. cit.* 198.—H. Bn. *Dict. Encycl. Sc. Méd.* vi. 410. — *Soccus major* Rumph. *Herb. Amboin.* i. 104, t. 30.—*S. minor* Rumph. *op. cit.* t. 31.—*Tsaja marum* Rheed. *Hort. Malab.* iii. 17, t. 26–28.—*Rademachia Integra* Thunb.—*Polyphema Jaca* Lour. —*Sitodium cauliflorum* Gærtn. *Fruct.* i. 345, t. 71, 72 (*Jaquier Jak, Jaca*).

[3] L. f. *loc. vit.*—Hook. *Bot. Mag.* t. 2869, 2871.—Tréc. *loc. cit.* 110.—Mér. et Del. *loc. cit.* 455.—H. Bn. *Dict. Encycl. Sc. Méd.* vi. 410. —*A. Communis* Forst.—*Soccus granosus* Rumph. *Herb. Amboin.* i. 112, t. 33.—*Rademachia incisa* Thunb. *Act. Holm.* xxxvi. 252.—*Rima* Sonner. *Voyag.* 99, t. 57–60.—*Iridaps Rima* Commers. (*Arbre à Pain, Rima*).

[4] Lamk. *Dict.* iii. 209.—Tréc. *loc. cit.* 117.—*Iridaps* Commers. herb.!—*A. philippinensis* Lamk. *loc. cit.* 210.—(*Jaquier eterophylle*).

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[1] Roxb. *Fl. Ind.* iii. 524.—Wight, *Icon.* t. 681 (*Dhea-phul-Burhul Bengal*).

[2] W. *Spec.* iv. 189.—Tréc. *loc. cit.* 122.—*A. hirsuta* Roxb.—*Ansjeli* Rheed. *Hort. Malab.* iii. 25, t. 32.

[3] Tréc. *loc. cit.* 111.—*A. pubescens* Bl. *Bijdr.* 481 (nec W.).—Zoll. *Verz.* 76 (*Bendaah*).

[4] Zoll. ex Rosenth. *op. cit.* 1108. The same author also cites as very dangerous the juice of *A. venenosa* Zoll.

[5] Pers. *Syn.* ii. 531.—Tréc. *loc. cit.* 115.—*Polyphema Champeden* Lour. *Fl. Cochinch.* (ed. 1790), 547 (*Tjampeda, Cay Mitnai* of the Annamites).

[6] The fruit of *A. brasiliensis* Gomez, which is probably only a species introduced from India, is cited as edible.

[7] Mart. *Syst. Mat. Med. Bras.* 34.—Miq. in *Mart. Fl. Bras. Urtic.* 130, t. 40 (*Ambauba do Vinho, Mansa*). Its fruit and that of the following species are mucilaginous, sweetish acidulate, of an agreeable taste; and these species are said to deserve cultivation as fruit trees. (Mart. *Reis.* iii. 1130).

[8] Mart. *Syst. Mat. Med. Bras.* 34.—Miq. *loc. cit.* 130, t. 39.

[9] Mart. *Reis.* iii. 1130; *Mat. Med.* 34.—Miq. *loc. cit.* 123, t. 36.—*P. multifida* Tréc.

[10] Notably *C. concolor* W. *Humboldtiana* Kl. (*C. peltata* W. not L.). See Rosenth. *op. cit.* 197.

[11] L. *Pug. Pl. Jam. Amœn. Acad.* v. 410.—Jacq. *Obs.* ii. t. 46, fig. 4; *Amer.* t. 262.—Mart. *Reis.* iii. 1130; *Fl. Bras. Urtic.* 210.—Miq. *loc. cit.* 149.—Lindl. *Veg. Kingd.* 275.—Endl. *Enchirid.* 169.—Mér. et Del. *Dict. Mat. Méd.* ii. 166.—Bosenth. *op. cit.* 197.—*Yaruma* Ovied. *Sumar.* (ed. 1547), fol. 82, *b*.—Sloan. *Hist.* i. 137, t. 88, fig. 2, t. 89 (*Bois-trompette, Bois-canon, Figuier de Surinam, Shake-wood* of the English.

Caribs formerly made trumpets with which they called the people to war and to religious ceremonies. Now water conduits and gutters are made of it. The wood is light and soft. By brisk rubbing, with the aid of a pointed piece of hard wood sunk in its tissues and caused to rotate rapidly by means of a cord or strap, fire is produced, and other species of the same genus, *ambaiba*,[1] are used by the natives of Brazil for the same purpose. The wood of the root is generally preferred to that of the stem. The young branches of many species furnish a fibre of which very stout fabrics are woven and made into hammocks and vestments. But the most useful industrial product of the *Artocarpeæ* is probably the caoutchouc extracted from their latex. All the caoutchouc gathered in southern Mexico, Panama, Honduras, Nicaragua, San-Salvador, Costa-Rica, Guatemala, the Antilles, Columbia, Equador and Peru, that is to say, in the west of America between 25° N. lat. and about 25° S. lat. is the product almost exclusively of *Castilloa elastica*[2] (fig. 122). In Nicaragua the juice is collected at all seasons, but not so much in the rainy, when it is much less abundant.[3] Incisions are made in the trunk in two different modes. Sometimes a long vertical cut is made intersected by oblique ones; sometimes, as in Nicaragua, the incision is in the form of a continuous spiral, with an inclination to the horizon of 45°; and if the tree is large, another spiral incision is made in a contrary direction to the former; but this double incision is very injurious to the plant. An iron gutter placed at the foot of the tree conducts the juice to buckets of the same metal, and in the evening it is strained; after this, it is treated with juice prepared from certain plants[1] which coagulate the caoutchouc. The latter becomes a floating mass in a brown liquor of a cheesy odour; the mass is subjected to an iron press and then dried.[2] In tropical Asia, in Australia and perhaps also in Angola and Benguela, on the coast of Africa, there are other *Artocarpeæ* which produce the greater part of the caoutchouc exported. They belong to the genus *Ficus* and, among a great number of species imperfectly defined,[3] are especially mentioned *F. elastica*,[4] *laccifera*[5] and *religiosa*[6] in Asia, *macrophylla*[7] and *rubiginosa*[8] in Australia. In the province of Assam the former of these is chiefly employed; incisions are made in the trunk and aerial portions of the roots with a peculiar knife (*daos*). The juice flows into troughs dug in the ground, or into channels formed by the leaves; it is richer in caoutchouc during the cold season. It is treated with warm water till it coagulates; after which it is pressed and dried in the sun. In Java the juice is allowed to dry upon the tree itself. Generally the caoutchouc of *Ficus* is impure. Even when it contains no bark or earth, it is of less value than the American produce. Besides this substance, now so serviceable in industry domestic economy and medicine, the products of the Fig trees are so numerous and so various that it is almost impossible to enumerate all. The common Fig[9] (fig. 124–126) is especially known for the quality of its fruit. Figs are eaten dry, and, in that case, not only the fruit proper (which are drupes with a sarcocarp of little thickness, except at the edges), but also the receptacle which envelopes it and into which has passed a certain quantity of saccharine matter, is eaten; or fresh, and then generally the receptacle, insipid or of a disagreeable flavour, is rejected,[1] and only the drupes are taken of which the flesh and foot only are succulent and of an agreeable taste, constituting a wholesome aliment for man and also for certain animals which are fattened on figs where they are very abundant. They are sometimes used, especially in the south-west of Europe, to make alcohol. They are a pectoral fruit.[2] From them are prepared sweet beverages and soft poultices. The latex contains caoutchouc; but it is not certain that it is extracted. This acrid purgative juice serves to destroy warts. It has been employed as a sympathetic ink and also, in the time of the Romans, for making a kind of stucco. The wood is porous and of little solidity; that of old trunks has always been used in the south of Europe for making screws of presses. Younger it is seamed with hard concretions similar to the cystoliths of the leaves, and may replace emery for polishing. The leaves have also been used to produce a reddish yellow dye. The other useful Fig trees are very numerous and have very various properties.[3] *F. heterophylla* L. F. serves as an astringent in India. *F. Sycomorus* L. (*Sycomorus antiquorum* GASP.), a noted species on the banks of the Nile, has edible fruit. Its wood was formerly used to make coffins and mummy cases, and also for the carved figures, sometimes so remarkable, which extend back to the remotest period of ancient Egyptian civilization. *F. hispida* L. (*F. Dæmonum* ROXB.), the juice of which is very poisonous, is used against aphtæ, and angina. *F. amboinensis* KOSTL., of the Moluccas, passes as an astringent and febrifuge. Its root serves to intoxicate fish. *F. toxicaria* L. (*F. Padana* BURM.) has a juice rich in caoutchouc and very poisonous. Likewise *F. septica* RUMPH., which, in the Moluccas, is employed as a vermifuge and also, we are assured, as a blister. *F. alba* BL., *fulva* REINW., and *nivea* BL. are fodder for horses in Java. *F. Altimeraalo* ROXB. is considered an aperient in the Philippines; it is employed as a sauce for fish. The leaves of *F. polycarpa* Roxb. (*F. copiosa* Steud.) are taken mixed with opium. *F. panifica* Del., or *Choddo* of Abyssinia, has an internal bark which is used for bread by the natives. They also eat the fruit of *F. Schimperiana* (*F. vallis* Del.). *F. courtallensis* (*Covellia courtallensis* Miq.) has been described by Rheede, under the name of *Valli Teregam*, as a very useful tree in India, its fruit being used in the treatment of stomatitis, its bark as a cure for leprosy, and its leaves for polishing wood and metal. In the Moluccas, *F. Wassa* Roxb. (*Caprificus aspera* Rumph.) is used in dressing viands; its bark is antidysenteric, and from its fruit is prepared a mixture supposed to facilitate parturition. In Malabar *F. parasitica* Koen. is sought as an antidysenteric, and its acrid latex is supposed to cure chronic affections of the liver. *F. undulata* Hamilt., of the same country, serves for the treatment of aphtæ, tumours, ringworm; *F. scaberrima* Bl., of Java, for pains. *F. septica* is a drastic, a vermifuge, and an energetic blister; the Javans consider it a violent poison. *F. benjamina* L. (*Urostigma benjaminum* Miq.) serves for the local treatment of sores produced by poisoned arrows; the chewed leaves and branches are applied to the point wounded. *F. benghalensis* L. (*Urostigma benghalense* Gasp.) has a tonic root, and edible fruit and leaves. *F. Karet* (*F. indica* Lamk.), one of the caoutchouc species, is employed as a tonic and for toothache. As astringents and resolutives are sought in tropical Asia and prescribed for a multitude of maladies of the liver, of the skin, of the mouth, etc., *F. indica* L. (*Urostigma Tjiela* Miq.), *nitida* Thunb., *infectoria* Roxb. (*F. venosa* Ait.), *Rumphii* Bl., *racemosa* L. etc. *F. Dæmonum* Vahl is considered a terrible poison. On the contrary, the fruit of *F. glomerata* Roxb., *F. amboinensis* Kost. (*Covellia racemifera* Miq.), *mollis* (*C. mollis* Miq.), *aspera* Forst., *Granatum* Forst., *Chanas* Forst. of Polynesia, and that of *F. pumila* Thunb., of China, and of *F. Johannis* Boiss., of the East, are edible. Several species are used to dye yellow, notably *F. tinctoria* Forst., a tree of Tahiti. *F. Ampelos* Burm. and *politoria* Lamk. are used in Java to polish wooden vases. The properties of the American Figs are analogous to those of the Old-world species. In Brazil *F. anthelminthica*[1] is extolled as very efficacious in the

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[1] Pison (*Bras.* ed. 1748, 72) and Marcgraff (*ibid.*, 91) have designated under the name of *Ambaiba* and *Ambauva* several species of *Cecropia*. The ashes are used to clarify molasses in the manufacture of sugar. The fruit is edible. The savages of Brazil hold with the foot the piece of Ambaiba root in which they make the pointed stick of hard wood rotate rapidly, and provide themselves with dried leaves or bits of cotton as tinder.

[2] Cervantes, *Suppl. à la Gazet. de Literat.* Mexico, 2 jul. 1794 (*Castilla*).—Tréc. *Ann. Sc. Nat.* sér. 3, viii. 136, t. 5, fig. 142–148.—Collins, *Rep. on Caoutch*, (1872), 11, t. 2 (*Ulé, Hulé, Ulé-ulé, Uli. Jebe, Tassa*). *Castilloa*, a little different from the type in the form of its leaves, which M. Lévy has reported from Nicaragua, and of which M. Collins speaks, cannot be distinguished specifically from *C. elastica* (*loc. cit.* 12, t. 3). Does the new species established by the same author under the name of *C. Markhamiana*, and which should also give caoutchouc, belong really to the same genus?

[3] In April the yield is 60 per cent. better than in October, the rainy season. A tree 18 inches in diameter may give in April, a maximum of 20 gallons of milk, from which is extracted 50 lbs. of caoutchouc. The single district of S.-Juan, in Nicaragua, has produced in one year 10,000 cwts. of caoutchouc (Collins, *loc. cit.* 15, 16), collected by 600 *huleros*.

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[1] It is the *Coasso* and *Achete* (*Ipomæa bona-nox*) that are previously macerated in the water. Treated with water only, the juice also coagulates, but much more slowly.

[2] It bears the name of *tortilla*, *torta*, *meros*, and weighs dry about a kilogr. When it has been dried by contact with the iron, it is rolled into balls called *cabezza*. The *bola* or *burucha*, is the caoutchouc dried on the tree itself at the surface of the incisions: it is the most esteemed in the United States, but is little abundant. The loss due to dessiccation, estimated at about 15 per cent., is called *merma* (Coll.).

[3] Or less worked than the others, as *F. Tæda* Reinw. (*Urostigma Karet* Miq.), *nymphæifolia* L. (*U. nymphæifolium* Miq.), *populnea* W. *indica* L. *elliptica* H. B. K. *prinoides* H. B. K. (which give the caoutchouc *de Guaduas* in Colombia), *gummifera* Miq. *Radula* W. (*Pharmascosyce Radula* Miq.), *anthelminthica* Mart. etc.

[4] Roxb. *Fl. Ind.* iii. 541.—Guib. *Drog. Simpl.* éd. 6, ii. 319.—Lindl. *Fl. Med.* 298.—Endl. *Enchirid.* 166.—Bosenth. *op. cit.* 195.—Coll. *Rep. on Caoutch.* 18.—*Urostigma elasticum* Miq. (*Kusnir*, *Kasmeer* in India, *Pohan Karet*, *Kohlehlet* in Java).

[5] Roxb. *Fl. Ind.* iii. 545. Wight, *Icon.* t. 656. —*Urostigma lacciferum* Miq. *Fl. Ind.-Bat.* i. p. ii. 575.—Thw. *Enum. Pl. Zeyl.* 265 (*But*).

[6] W. *Spec.* iv. 1134.—Roxb. *Fl. Ind.* iii. 547. —*Urostigma religiosum* Gasp.—*Arcalu* Rheed. *Hort. Malab.* i. t. 27 (*Aswat*, *Bogala*, *Pippa*, *Rai*, *Figuier des Pagodes*).

[7] Desf. ex Pers. *Synops.* ii. 609.—Benth. *Fl. Austral.* vi. 570.—*F. Huegelii* K. (ex Miq.).—*Urostigma macrophyllum* Miq. *Hook. Lond. Journ.* vi. 560.

[8] Desf. ex Vent. *Malmais.* t. 114.—Benth. *Fl. Austral.* vi. 168.—*Bot. Mag.* t. 2939.—*F. Australis* W. *Spec.* iv. 1138.—*Urostigma rubigiosum* Gasparr. *N. gen. Fic.* 7; *Ric. Caprif.* 82, t. 7, fig. 6–13.

[9] *Ficus Carica* L. *Spec.* 1513.—*W. Spec.* iv. 1131.—Roxb. *Fl. Ind.* iii. 528.—Guib. *op. cit.* ii. 317.—Endl. *Enchirid.* 166—Mér. et Del. *Dict. Mat. Méd.* iii. 254.—Lindl. *Fl. Méd.* 298.—Gren. et Godr. *Fl. de Fr.* iii. 103.—Berg et Schm. *Darst. Off. Gew.* t. 19 a.—Flueck. et Hanb. *Pharmacogr.* 487. (*Bou*, *Arbre à cariques*).

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[1] See H. BN. *Adansonia* ix. 318.

Fructus Caricæ OFF.—Συκῆ THEOPHR.

[3] ROSENTH. *op. cit.* 192, 1107.—LINDL. *Fl. Med.* 297.

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[1] Mart. *Syst. Mat. Med. Bras.* 88; *Pl. Med., Œcon. Bras.* t. 77.—*Pharmacosycea anthelminthica* Miq. *Mart. Fl. Bras. Urtic.* 85, t. 25 fig. 2 (*Coajingivia*).

treatment of verminal affections. *F. atrox*[1] is one of the plants from which the Indians of Rio-Negro prepare the curara, and the juice of *F. doliaria*,[2] which derives its name from the employment of its light wood for the fabrication of large vases for domestic use, is also considered very acrid. The juice of *F. radula*[3] is also a vermifuge and rich in caoutchouc, as likewise that of *F. vermifuga*.[4] *F. gummifera*, *prinoides* and *elliptica* K. are also reported as caoutchouc species in Columbia. Gum lac is a product of several Figs. Its formation is attributed to the *Coccus Lacca*, a hemipterous insect, the females of which, living in great numbers on the branches of the *Ficus indica* and *religiosa*,[5] produce thereon a sort of continuous crust from the resinous matter which exudes from their bodies. Imbedded in this reddish matter are found, not only the dead bodies of the females, but also eggs which, later on, are hatched and give birth to insects before the issue of which it is preferable to collect the lac.[6] This latter, formed into sticks, grains, or plates, is used in India for dyeing stuffs. When burnt it emits an agreeable odour, and colours the saliva when it has been masticated for some time. It is used to make varnish for fine cabinet work, and is especially prized among us for bead-work, for making sealing-wax and for the construction of some physical instruments. In medicine, it is employed as a tonic, as an astringent, and forms a constituent of several medicinal dentrifices.

Contrayerva,[7] belonging also to this family, consists of evergreen herbs and derives its name from the property attributed to it in central America as an antidote to the bite of venomous snakes. DRAKE root, brought from Peru by the celebrated navigator of that name at the end of the 16th century, and described by CLUSIUS in 1605,[8] was a blackish rhizome, clothed with adventitious roots and leaf-scars, attributed to *Dorstenia Houstoni*.[9] LINNÆUS thought that the true *Contrayerva* would prove to be the species of *Dorstenia* to which he had applied this specific name;[1] but this is Mexican, and the true *C.* of commerce, or *Caa-apia* of Marcgraff and of Pison,[2] is a Brazilian species, either *D. Cayapia*,[3] or *D. multiformis*[4] (fig. 108-111), which has exactly the same properties. *D. tubicina*[5] and *D. Faria*[6] are also employed as alexipharmics in the same region. They are reputed as anti-dysenterics. Their rhizomes are aromatic, tonic, and astringent. The same is true of certain African species, such as *D. radiata*,[7] used in Abyssinia in the treatment of cutaneous affections. The most active of the American *Contrayervas* is probably *D. brasiliensis*[8] (fig. 112), the mixed inflorescence of which is in the form of a circular disk, and its reddish stock has a feeble aromatic odour and a taste finally very acrid. It is stimulant and provokes perspiration; which doubtless explains the alexipharmic properties attributed to it, now quite forgotten. Like *Dorstenia*, *Streblus*, belonging to the *Moreæ* series, has been used in medicine in its native country, tropical Asia.[9] Many parts of the Mulberries are also useful. The black Mulberry,[10] a tree probably of Asiatic origin,[1] is especially cultivated for its fruit (fig. 101). It is a tolerably agreeable aliment, and at the same time a refreshing medicine, slightly astringent and acidulous. Its leaves, also employed in medicine, are used to feed silkworms. But for this purpose, preference is justly given to the white Mulberry [2] (fig. 98–100) which, introduced from China into India, thence into Persia, was brought to Constantinople at the time of the Lower Empire, and passed thence to Sicily and Italy, whence the French brought it after the conquest of Naples in 1494. Its compound fruit is edible, like that of the black Mulberry. Both have a bitter purgative bark formerly extolled as a vermifuge. The wood, as also that of the red Mulberry,[3] an American species, is solid, proof against the attacks of insects, susceptible of a fine polish and is used for making furniture and various utensils. The cortical fibres might, in case of need, be employed for textile purposes, but in this respect it is far surpassed by the paper Mulberry,[4] (fig. 102–107), a Chinese tree, now introduced in Europe, Oceania and America, and used to make paper and stuffs. Its wood is pale, porous, light and does not polish well. *Maclura* has a wood comparable to that of the preceding trees. That of *M. aurantiaca*,[5] or the Osage Orange, was used to make bows. The Indians of North America used to dye their faces with the yellow and fetid juice of its large round fruit, to frighten their enemies. The entire plant contains a colouring matter, much more developed in *M. tinctoria*.[6]

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[1] MART. Herb.—*Urostigma* (?) *atrox* MIQ. *loc. cit.* 105.

[2] MART. *Mat. Med. Bras.* 88.—*F. Gamelleira* K. *Ind. Sem. Hort. Berol.* (1846), 18.—*Urostigma doliarium* MIQ. *loc. cit.* 82; *Hook. Lond. Journ.* vi. 527 (*Gamelleira*, *Figueira Branca*).

[3] *F. anthelminthica* RICH. (not MART.).—*Pharmacosycea Radula* MIQ. *loc. cit.* 84, t. 25, fig. 1; *Hook. Journ.* vii. 64, t. 2, fig B.

[4] MART. Herb. — *Pharmacosycea vermifuga* MIQ. *loc. cit.* 87, n. 6.

[5] L. *Spec.* 1514.—W. *Spec.* iv. 1134.—ROXB. *Fl. Ind.* iii. 547.—LINDL. *Fl. Med.* 298.—*Urostigma religiosum* GASP. *Ric.* 82, t. 7, fig. 15.—*Arcalu* RHEED. *Hort. Malab.* i. t. 27 (*Figuier-pagode*, *F. des Pagodes*, *Bangan*, *Pippat*, *Aswat*, *Bogaha*, *Rai*).

[6] MÉR. et DEL. *Dict. Mat. Méd.* ii. 333.—LINDL. *Fl. Med.* 297.—GUIB. *Drog. Simpl.* éd. 6, ii. 319.

[7] GOMEZ, *De Contrayerva* (*Mém. Ac. Lisb.* 1803).—MÉR. et DEL. *Dict. Mat. Med.* ii. 672.—GUIB. *op. cit.* ii. 315, fig. 434, 435.

[8] *Exot.* lib. iv. cap. 10.

[9] L. *Spec.* ed. 4, 176; *Mat. Med.* 53.—MILL. *Dict.* iii. 86, n. 3.—PLENCK, *Ic. Pl. Med.* ii. 8, t. 103. Var. (?) of *D. Contrajerva.*

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[1] *D. Contrajerva* L. *Spec.* ed. 3, i. 176.—Jacq. *Ic. Rar.* iii. 18, t. 614; *Coll.* iii. 200.—Bur. *Prodr.* xvii. 259.—*D. Contrayerva* Mill. *Dict. loc. cit.* n. 1.—Descourt. *Fl. Med. Ant.* iii. 256, t. 207.—Lindl. *Fl. Med.* 300.—*D. Houstoni* Lodd. *Bot. Cab.* t. 1005 (not L.).—*D. Sphondylii folio, Dentariæ radice* Plum. *Nov. Gen. Amer.* 29, t. 8; *Pl. Amer.* (ed. Burm.), t. 119. The *D. Drakena* L. (*Spec.* ed. 4, 176;—*D. mexicana* Benth. *Pl. Hartweg.* n. 386) is also employed like *Contrayerva.*

[2] *Bras.* ed. 1, 52, 90, c. ic.; ed. 2, 232, 311, c. ic.

[3] Velloz. *Fl. Flum.* i. t. 137.—Bur. *Prodr.* n. 5.—*D. Bryoniæfolia* Mart. *Mat. Med. Bras.* 106.—Miq. *Mart. Fl. Bras. Urtic.* 167.—*D. palmata* Pohl.—*D. vitifolia* Field. et Gardn. —*D. morifolia* Fisch. (*Carapia*).

[4] Miq. *Mart. Fl. Bras. Urtic.* 165, t. 57-59. —*D. arifolia* Lamk. *Dict.* ii. 317; *Ill.* t. 83, fig. 2.—*D. Cyperus* Velloz. *Fl. Flum.* t. 140.— *D. Mandioccana* Fisch.—*D. pinnatifida* Miq.— *D. fluminensis* Walp.—*D. Ceratosanthes* Lodd. *Bot. Cab.* t. 1216.—Hook. *Bot. Mag.* t. 2760.— *Sychinium ramosum* Desvx. *Ann. Soc. Linn. Par.* iv. 217, t. 12.

[5] R. et Pav. *Fl. Per.* i. 65, t. 102, fig. b.— Hook. *Bot. Mag.* t. 2804.—*D. infundibuliformis* Lodd. (*Tusilla* in Venezuela).

[6] Paiv. ex Spreng. *Syst.* iii. 777.—Miq. *Mart. Fl. Bras. Urtic.* 168.

[7] Lamk. *Dict.* ii. 318.—Bur. *Prodr.* n. 58.— *Kosaria Forskhalii* Gmel. (*Kosar* of the Abyssinians).—*D. chinensis* Lour., a stimulant aromatic plant is not, it is thought, of this family (Bur.).

[8] Lamk. *Dict.* ii. 317.—Bur. *Prodr.* n. 6.— *loc. cit.* 315.—Lindl. *Fl. Med.* 300.—Mart. *Fl. Bras. Urtic.* 215,—*D. placentoides* Commers.— D. *tomentosa* Fisch.—*D. montevidensis* Gardn. These plants contain a bitter principle and a warm diuretic and diaphoretic essence (Mart.).

[9] *S. asper* Lour. (p. 195, note 5) is recommended in Java for epilepsy, rheumatic affections, gout, and after childbirth (*Amplas, Sakhotuka, Barinka*). *S. macrophyllus* Bl. (*Diplocos? macrophylla* Bur. *Prodr.* xvii. 216) it used to make pestles for pounding rice (*Tamboin* of the Javans).

[10] *Morus Nigra* L. *Spec.* 1398.—Duham. *Arbr. fruit.* ii. 42, t. 8; *Arbr.* (éd. 2), iv. 90, t. 22.— Ser. *Mur.* 220, t. 6, fig. 1, t. 19.—Bur. *Prodr.* xvii. 238, n. 1.—Lindl. *Fl. Med.* 300.—Guib. *loc. cit.* 322, fig. 438.—Gren. et Godr. *Fl. de Fr.* iii. 103.—Caz. *Pl. Méd. Ind.* éd. 3, 671.— Flueck. et Hanb. *Pharmacogr.* 489.

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[1] A. DC. *Geogr. Bot.* 856, 981, 986.

[2] *M. Alba* L. *Spec.* 1308.—Lamk. *Dict.* iv. 373; *Ill.* t. 762, fig. 2.—Loud. *Arboret.* iii. 1398.—Ser. *Descr. Mûr.* 191.—Endl. *Enchirid.* 165.—Rosenth. *op. cit.* 191.—Bur. *Prodr.* xvii. 238, n. 2.—*M. macrophylla* Moret.—*M. Merettiana* Jacq.—*M. tatarica* L.—*M. constantinopolitana* Poir. *Dict.* iv. 381. — *M. byzantina* Sieb.—*M. Indica* L.—*M. cuspidata* Wall.—*M. rubra* Lour. (not L.).—*M. latifolia* Poir.—*multicaulis* Perr.—*M. cucullata* Bonaf.—*M. bullata* Balb.—*M. chinensis* Lodd.

[3] L. *Spec.* 1399. — Poir. *Dict.* iv. 377.—Michx. *Fl. Bor-Amer.* ii. 179; *Arbr. for.* iii. 232, c. ic.—Duham. *Arbr.* éd. 2, iv. t. 23.—Ser. *Mûr.* 223, t. 20.—Bur. *Prodr.* n. 3.—*M. canadensis* Lamk.—M. *pensylvanica* Nois.—*M. missouriensis* Audib.

[4] *Broussonetia papyrifera* Vent. *Tabl.* iii. 547.—Bur. *Prodr.* xvii. 224, n. 2.—*Morus papyrifera* L. *Spec.* 1399.—*Papyrius japonica* Poir. *Dict.* v. 3.—*Papyrus legitima* Kæmpf. *Amæn. Exot.* 471. ic. (*Hoa*, *Tchou* of the Chinese, *Ri*, *Kaadsi Kansi*, *Sjo*, *Kami noki* of the Japanese).

[5] Nutt. *Gen.* ii. 234; *N.-Amer. Sylv.* i. 126, t. 37, 38.—Lindl. *Loud. Encycl.* 784, fig. 13256.—Loud. *Arboret.* iii. fig. 1826–1828. — Ser. *Mûr.* 232, t. 27.—Guib. *op. cit.* ii. 324 (*Bow wood*, *Bois d'arc*). Good prickly hedges may be made of this tree, and it is also said to be a good substitute for the mulberry in feeding silk worms.

[6] D. Don, ex Bur. *Prodr.* xvii. 228. — *M. Plumiera* Don.— *M. Xanthoxylon* Endl. *Gen.* Suppl. iv. p. ii. 34. — *M. velutina* Bl. *Mus. Lugd.-Bat.* ii. 82.—*M. chlorocarpa* Liebm.—*Morus tinctoria* L. *Spec.* ed. 2, 1399.—Velloz. *Fl. Flum.* x. t. 22.—*M. Xanthoxylon* L.—*Broussonetia tinctoria* Spreng. *Syst.* ii. 901.—H. B. K. *Nov. Gen. et Spec.* ii. 32.—*B. Plumierii* Spreng. —*B. Xanthoxylon* Mart. *Herb. Fl. Bras.* 250.—*Chlorophora tinctoria* Gaudich. (*Fustic*, *Fustete*, *Gelbholz*, *yellow wood* of the Antilles, *Lechero*, *Dinde* in Colombia, *Moreira*, *Amoreira*, *Amora de arvore* in Brazil.

The latter has astringent fruit used in medicine, like the Mulberries, a fine wood which might be employed with advantage in cabinet work, a resinoid juice, called the marrow of Cuba,[1] proposed for the treatment of scurf, and a colouring matter highly prized for dyeing in the New World. There are also yellow dye woods in Brazil from trees of the genus *Maclura*;[2] and the *Bagassa* wood of Guyana which is that of *Bagassa guianensis*,[3] has analogous properties and might equally be employed in cabinet work.

The most useful woods of this family are the *Elms*. The common Elm[4] (fig. 81–94), excellent as fuel, is good for making a great variety of articles; it is used by turners, joiners, cabinet makers and builders. Of its knobs are made trunks and articles of furniture. The bark is used for tanning skins, to make mats, cords, string, paper, and to dye yellow; it has been much used in medicine as a tonic, astringent, for ringworm and intermittent fever. Its young leaves are given to beasts, and its fruit has served as an aliment to man, being eaten green as a salad in some countries. *Ulmus alata*,[5] *americana*[6] and *fulva*[7] have analogous uses in the United States. The wood is much used in building. The bark is emollient, used as poultice, and is said to be edible. From that of *U. alata* decoctions are prepared and applied as lotions to chaps, chilblains and gunshot wounds, and are taken internally for cough and dysentery. *U. parvifolia*[8] was celebrated at a certain epoch under the name of *Thé de l'abbé Galois*. Its leaves sometimes bear a gall which the Chinese use to dye and tan skins.[9] *Planera aquatica*[10] furnishes a wood employed in the south of the United States. *Abelicea cretica*,[11] or

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[1] Guib. *op. cit.* ii. 324.

[2] Mart. *Fl. Bras. Urtic.* 210.

[3] Aubl. *Guian.* ii. Suppl. 15, t. 376 (*Bagassier*). It is especially useful for making light canoes.

[4] *Ulmus campestris* L. (part.).—Sm. *Engl. Fl.* ii. 20.—Pl. *Prodr.* xvii. 156.—Gren. et Godr. *Fl. de Fr.* iii. 105.—Guib. *Drog. Simpl.* éd. 6, ii. 314.—Lindl. *Fl. Med.* 303.—Mér. et Del. *Dict. Mat. Méd.* vi. 799.—Endl. *Enchirid.* 163. —Caz. *Pl. Méd. Ind.* éd. iii. 716.—Rosenth. *op. cit.* 189.—Flueck. et Hanb. *Pharmac.* 500 (*Ormeau, Ormille, Umeau. Arbre à pauvre homme*).

[5] Michx. *Fl. Bor.-Amer.* i. 173.—Michx. f. *N.-Amer. Sylv.* iii. t. 127 (*Wahoo*).

[6] W. *Enum. Hort. Berol.* 295.—*U. Floridana* Chapm. *Fl. S. United St.* 416 (*white Elm*).

[7] Michx. *op. cit.* i. 172.—*U. rubra* Michx. f. (*slippery Elm*).

[8] Jacq. *Hort. Schœnbr.*. iii. t. 261.—Pl. *Prodr.* xvii. 161, n. 13.—*U. chinensis* Pers. *Enchirid.* i. 67.—Turp. *Dict. Sc. Nat.* Atl. t. 281, 282.—Loud. *Arboret.* iii. 1377.—*Microptelea parvifolia* Spach, *Ann. Sc. Nat.* sér 2, xv. 358.

[9] *U. major* Sm. *Glabra* Sm. *tiliæfolia* Host. have nearly the same uses as *U. campestris*. *U. pumilla* is used in Siberia to make a tea-like infusion. In Japan, *U. Kejaki* Sieb. has a useful wood.

[10] See p. 188, note 6.

[11] *Zelkova Cretica* Spach, *Suit. à Buffon*, 121.—Pl. *Prodr.* xvii. 166.—*Pseudo-Santalum Creticum* Bauh. *Pinax*, 393.—*Quercus Abelicea* Lamk.—*ABCdaria* L. Herb.!

False-Sandal of Crete, has a reddish odorous wood, said to be astringent and detersive. *A. crenata*[1] has a solid wood for carpentry and cabinet work. The Dates are also useful trees. That of Provence[2] (fig. 95–97) serves to make a great number of domestic articles[3] and musical instruments; productive hedges of it are planted in the South. Its leaves feed cattle, and its seed pressed furnishes an oil for burning. The *Date* of the West,[4] a species from the United States, has also a useful wood employed by carvers and musical instrument makers. Its astringent bark is used for tanning, and also as a febrifuge. Its leaves are said to strengthen and fatten horses. *Celtis Tournefortii*[5] and *crassifolia*,[6] oriental species, are also astringent plants, prescribed for various kinds of flux. *Trema orientalis*;[7] a beautiful tree of tropical Asia, introduced into the Mascarene isles, is reputed a remedy for epilepsy; and *T. micrantha*,[8] a Central American species, has a textile liber of which cord and stuffs are made in the Antilles.

The textile qualities of the bark are common, therefore, in this family, to a number of *Ulmeæ* and *Moreæ*. But they find their greatest development in the *Cannabineæ*, and principally in the cultivated Hemp[9] (fig. 129–136), an herb of Asiatic origin and sought everywhere for the textile fibres of its liber. Their arrangement in parallel longitudinal bundles, separated from each other by similarly longitudinal zones of cellular tissue, renders them easily separable by soaking and heating, as is usual in plants eminently textile.[10] It is unnecessary to speak of the stuffs, cordage and various articles prepared from the hemp, its tow and its fibre. These substances are also used to make paper.[11] Much has been said of the particular intoxication produced by emanations from the hemp fields. The leaves of the cultivated hemp have quite a peculiar action on the system which they appear to owe to two volatile essential oils;[1] these are most abundant in the Indian Hemp,[2] from which the *haschisch* of the Orientals is prepared, a substance considered by them exhilarating and aphrodisiacal, which produces a delirious intoxication, much studied by physiologists and physicians.[3] As a medicine, the Hemps, after producing a passing excitement of the nervous centres, finally become sedative and stupefying.[4] The fruit of the Hemp or hempseed is especially valued for the oil it contains which renders it edible, especially for birds and small cattle. This oil is used for burning, to make soap and paint, and the cake is employed to feed and fatten animals.[5] The ancients ate torrefied hempseed to stimulate the stomach. The Hop[6] (fig. 137–145) is quite as widely celebrated. Its young shoots (hop sprouts) are eaten in the north like asparagus. They, as well as the roots and multiple fruit (cones), are used in medicine as tonics, bitters, purifiers and diaphoretics. The cones are employed principally to aromatise beer, and the intensity of its action depends upon its richness in *lupulin*.[7] This is also a narcotic and sedative. The leaves of the Hop have been used for dyeing, and its annual branches[8] have a textile bark used to make bands, coarse threads, and cordage. The climbing branches of the Hop are very ornamental. Under this head, this family does not present many choice plants, beyond the fine trees which, in our plantations, are derived from the genera of the Elm, Date, Mulberry, *Broussonetia*, and the beautiful species of *Ficus* which are grown in our gardens and houses as foliage plants.[1] There are but few American and Asiatic Figs the wood of which is of any utility, as it is generally soft and brittle; mention is made, however, in India, of *Ficus religiosa*, from which idols are sculptured; in Tahiti, of *F. tinctoria* FORST., of which some domestic utensils are made; in Abyssinia, of *F. panifica*, MIQ., employed for the same purpose, the specific name of which is derived from the natives eating the inner bark as bread; in Java, of *F. alba* BL. and *fulca* REINW., *Maclura javonica* BL. and *Cudranus amboinensis* of RUMPHIUS, the woods of which are coloured yellow. The *Letter* or *Snake wood* of Guyana is attributed to plants of this family. *Piratinera guianensis* is the best known. The negroes make rice-pestles and canes of it; and the Galibis their bows and traps (*boutous*). The spotted kind of commerce comes, it is said, from *Brosimum guianense*, a species of the same genus, as well as, very probably, from *Ferolia guianensis* of AUBLET, which produces the *Bois satiné*, or *Ferole*, an excellent red essence, streaked with yellow, heavy, compact and susceptible of a fine polish.

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[1] *Zelkova crenata* SPACH, *lac. cit.* 118.—PL. *loc. cit.* 165.—*Rhamnus carpinifolius* PALL.—*Ulmus polygama* L. C. RICH.—*Planera crenata* DESF.

[2] *Celtis Australis* L. *Spec.* 1478.—PL. *Prodr.* xvii. 169, n. 1.—*Lotus Arbor* LOBEL. *Adv.* 439. —*L. fructu Cerasi* BAUH. *Pinax*, 447 (*Fabrecoulier*, *Fabreguier*, *Fenabrègne*, *Bois de Perpignan*).

[3] Shafts, forks, whips, hoops, etc.

[4] L. *Spec.* 1478.—PL. *Prodr.* 174, n. 10.—*Lotus arbor virginiana fructu rubro* RAI, *Hist.* 1917 (*M. des Antilles*, *M. Ramon*).

[5] LAMK. *Dict.* iv. 138.

[6] LAMK. *loc. cit*, 132.—MICHX. F. *Arbr.* iii. 228, t. 9.—PL. *Prodr.* n. 13.

[7] *Celtis orientalis* L. *Fl. Zeyl.* 176.—*Sponia orientalis* PL. *Prodr.* xvii. 200, n. 14.

[8] *Celtis micrantha* SW. *Fl. Ind.-Occ.* i. 157.—*Sponia micrantha* DCNE. ex PL. *loc. cit.* 203, n. 25.—*S. peruviana* KL. *Linnæa*, xx. 536.

[9] See p. 164, note 2.

[10] On the structure of hemp and its liber, see REISSEK, *Die Faserg. d. Leines*, etc. *Denkschr. Ak. Wiss. Wien*, vi.—OLIV. *Stem Dicot.* 34.—DUTAILLY, *Rech. Anat.-Phys. sur le Chanvre*, *Adansonia*, ix. 263.

[11] The wood, stripped of its bark or *chènevotte*, is used to make matches, light canes, charcoal for powder, etc.

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[1] *Cannabine* ($C^{36}H^{20}$) and a *hydrate* of *cannabine* ($C^{12}H^{14}$), distributed through the whole plant (Personne). It contains besides a resinous matter *cannabine* or *haschischine* (Smith).

[2] *C. Indica* Lamk. *Dict.* i. 695.—*C. chinensis* Del. (var. of *C. sativa*).

[3] Mér et Del. *Dict. Mat. Méd.* ii. 68.—Guib. *Drog. Simpl.* éd. 6, ii. 331.—Rosenth. *op. cit.* 201.—Personne, *Journ. Pharm.* (1857).—Villard, *Thès. Fac. Méd. Par.* (1872).—Muell. *Journ. Pharm. et Chim.* sér. 3, xxvii. 296 (*Bang. Banghie, Guaza*).

[4] See *Dict. Encycl. Sc. Méd.* xv. 398.—Berg et Schm. *Darst. Off. Gew.* t. 19 b.

[5] Pulverised, it is used to counterfeit pepper.

[6] *Humulus Lupulus* L. *Spec.* 1457.—Sm. *Engl. Bot.* t. 427.—Reichb. *Ic. Fl. Germ.* xii. t. 656. A. DC. *Prodr.* xvi. 29.—Guib. *op. cit.* ii. 332, fig. 441–443.—Lindl. *Fl. Méd.* 296—Berg et Schm. *Off. Gew.* t. 27 b.—*H. americanus* Nutt.—*Lupulus communis* Gærtn. *Fruct.* t. 75.—*Cannabis Lupulus* Scop. *Fl. carniol.* ii. 263 (*Vigne du Nord, Salsepareille nationale*).

[7] *Lupuline, lupulite.* This substance is formed of yellow, resinous glands, abundant especially in the bracts. These organs are epidermic cells which, increasing in size, close in and become a sort of cupule, formed of several radiating cells, supported by a small foot. The cuticle which lines the lower surface of this cupule is raised by a yellowish secretion which fills it from bottom to top like the finger of a glove, so that it forms a conical projection above the cupule (Trécul). Then the *lupulin* is completely developed (Guib. *loc. cit.* 335, fig. 443.—Berg et Schm. *t. cit.* fig. x).

[8] On their structure, see H. Mohl, *Ueb. d. Bau d. Rank. und Schlingpfl.* Tubing. (1827), § 75; *Bot. Zeit.* (1855), 889.

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[1] *Maclura* and *Abelicea* are more rarely cultivated in the open ground and in our conservatories, *Dorstenia*, curious for the varied form of the receptacle of its inflorescence, *Conocephalus* and *Artocarpus* for the beauty of their foliage, and *Treculia africana* and an *Antiaris*. Many useful products have necessarily been omitted in the enumeration we have just made. *Calius lactescens* BLANCO (p. 164, note 12) has an edible fruit and a milky juice, but it is not poisonous, for small cattle feed on its leaves when other forage fails. Friction with the macerated bark is said to cure the bite of venomous snakes. *Getah-lahoe*, a kind of vegetable wax of Sumatra, attributed to *Ficus cerifera* BL. to *Bleekrodea*, and to certain *Sapotaceæ*, appears to render great service in surgery as a local agglutinative medicine (VANHENGEL), and also internally as an antidiarrhœtic. This substance might also be employed for making tapers (BLEEKRODE, *Ann. Sc. Nat.* sér. 4. iii. 330, t. 11), Many fossil plants belonging to this family enter into the constitution of certain lands. UNGER (*Chlor. Protog.* t. 24–26) has described *Ulmites* and *Ulminium*. There are Elms and Figs in the tertiary strata (SAP. *Ann. Sc. Nat.* sér. 4, xix. 112; sér. 5, xviii. 39, etc.).

GENERA.

I. ULMEÆ.

1. **Ulmus** T.—Flowers hermaphrodite or more rarely polygamous; receptacle short generally rather concave. Calyx marcescent, 5–8-lobed, imbricate. Stamens equal in number and opposite to lobes; filaments inserted more or less deeply in the cupule of the receptacle (hence slightly perigynous) free exserted; anthers in æstivation erect extrorse; cells 2, longitudinally rimose. Germen (sometimes in male flower effete) 2-carpellar, 2-locular; the second cell abortive effete (or more rarely fertile); style short, 2-fid at apex; lobes densely papillose-stigmatose within. Ovules descending anatropous; micropyle extrorsely superior. Fruit samaroid, clothed at base with cupule of receptacle and often stipitate, surrounded by a marginal wing entire or more or less ciliate; cell eccentric compressed reticulately veined, sometimes longitudinally nerved, 1-spermous. Seed descending; coat membranous, 2-plicate; cotyledons of exalbuminous embryo plane or plano-convex rather fleshy; radicle superior straight.—Trees or shrubs, not milky; branches sometimes suberose; leaves alternate, 2-stichous, serrate penninerved, unequal at base; stipules lateral free; flowers early or rarely late, breaking from perulate buds, collected in loose shortly stipitate compound cymes; pedicels articulate, bracteolate. (*Temp. and sub-frigid regions of the north. hemisphere of both worlds.*) See p. 140.

2? **Holoptelea** Pl.[1]—Flowers (nearly of *Ulmus*) polygamo-monœcious, 4–8-merous; stamens rarely free from sepals equal in number, oftener 8–16. Fruit samaroid peripterous; wing subentire or marginately excised, glabrous or softly pubescent. Seed exalbuminous; cotyledons of somewhat fleshy embryo deeply 2-lobed, conduplicate to medial nerve; radicle subclavate incurved. Other characters of *Ulmus*.—A tree; leaves 2-stichous entire; flowers early compound cymose; cymes springing from the naked twigs of the past year, ebracteate. (*East Indies*.[1])

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[1] *Ann. Sc. Nat.*, sér. 3, x. (1848). 259; *DC. Prodr.* xvii. 163.

3. **Planera** Gmel.[2]—Flowers (nearly of *Ulmus*) polygamo-monœcious, 4–5-merous; stamens 4, 5, alternate with lobes of perianth exserted. Germen (in male flower effete) and other characters of *Ulmus*; ovule descending amphitropous. Fruit dry (utricular) crustaceous fragile, shortly stipitate and there girt with emarcid perianth, the whole exterior cristate with complanate unequal lamellæ or prickles, apiculate with indurated base of style, indehiscent. Seed descending, obliquely ovoid; hilum linear; cotyledons of exalbuminous embryo unequal; the one larger enfolding the other.—A tree;[3] branches distichous;[4] leaves alternate 2-stichous, ovately oblong, unequal at base, unequally crenate or serrate; stipules lateral free, caducous; flowers[5] early, breaking from perulate buds, shortly compound cymose or glomerulate. (*North America*.[6])

4. **Abelicea** Belli.[7]—Flowers (nearly of *Ulmus*) hermaphrodite or oftener polygamo-monœcious, 4–5-merous; perianth subcampanulate. Stamens equal in number and opposite to lobes of perianth and other characters of *Ulmus* (or *Planera*). Fruit (utricular) ovoideo-gibbous, hence produced to a short keel (*Zelkova*) or sometimes to a narrow wing (*Hemiptelea*,[8]) laterally beaked at apex with base of style; exocarp thin, finally dry; putamen rugose. Seed suspended from apex of cell subamphitropous; cotyledons of exalbuminous embryo plano-convex corrugate, at apex and base 2-fid or 2-lobed; radicle superior rather long.—Trees; branches

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[1] Spec. 1. *H. integrifolia* Pl. — *Ulmus integrifolia* Roxb. *W. Spec.* i. 1326; *Pl. Corom.* i. 56, t. 18.—Edgew. *Journ. As. Soc. Bengal.* ex *Bot. Zeit.* (1852), 840.—Thw. *Enum. Pl. Zeyl.* 267.

[2] *Syst.* 305. Spach, *Ann. Sc. Nat.* sér. 2, xv. 355; *Suit. à Buffon*, xi. 115.—Endl. *Gen.* n. 1849^1.—Pl. *Ann. Sc. Nat.* sér. 3, x. 261; *Prodr.* xvii. 167.

[3] Appearance of *Carpinus*.

[4] Bare at time of flowering.

[5] Small, dark yellow.

[6] Spec. 1. *P aquatica* Gmel.—W. Spec. iv. 567.—A. Gray, *Man.* ed. 5, 443.—Chapm. *Fl. S. Unit. St.* 417.—*P. ulmifolia* Michx. f. *Arbr.* iii. 283.—*P. Gmelini* L. C. Rich. *Michx. Fl. Bor.-Amer.* ii. 248. — Desf. *Arbr.* ii. 446.—Roem. et Sch. *Syst.* vi. 305.—*Anonymos aquatica* Walt. *Fl. Carol.* 230.

[7] Ex Clus. *Hist.* p. ii. 302.—*Zelkova* Spach, *Ann. Sc. Nat.* sér. 2, xv. 356; *Suit. à Buffon*, xi. 117.—Endl. *Gen.* Suppl. ii. n. 1849.—Pl. *Prodr.* xvii. 165.

[8] Pl. *Compt. Rend. Ac. Sc.* (Jan. 1872); *Prodr.* xvii. 164.

2-stichous, sometimes spinescent; leaves[1] alternate, 2-stichous, crenato-serrate and other characters of *Planera*; buds perulate; flowers[2] coetaneous; the male in crowded cymes; the female few or solitary axillary.[3] (*Crete, Caucasian region, temp. east. Asia, north. China.*[4])

5. **Celtis** T.[5]—Flowers polygamo-monœcious, 2-morphous. Sepals 5, or rarely 4, much imbricated, in female or hermaphrodite flower deciduous. Stamens same in number opposite; filaments free (longer in male flower), incurved in æstivation and more or less clearly elastically dissilient and at anthesis rigidly divergent; anthers introrse, before anthesis connivent in centre of flower; cells sometimes swollen at base, longitudinally rimose. Germen (in male flower rudimentary or 0) girt at base with pilose annular disk, 1-locular; style branches 2, thickly subulate wide recurved, entire or at apex emarginate or dilately 2-lobed (*Solenostigma*[6]); lobes linear (*Momisia*[7]) or sometimes (*Momisiopsis*[8]) 2-fid, densely stigmatose within; ovule inserted under apex of cell descending amphitropous; micropyle extrorsely superior. Fruit drupaceous naked, oftener globose; flesh generally scanty; putamen more or less rugose, 1-spermous. Seed descending amphitropous; coat thin; cotyledons of much incurved embryo foliaceous wide unequally conduplicate cucullately replicate and corrugate; one enfolding the other, enclosing the incumbent and ascending radicle; albumen slight between the folds of the cotyledons mucous or 0.—Trees or shrubs, unarmed or spinous; leaves alternate, 2-stichous, persistent or caducous in winter, oftener unequal-sided at base, entire or dentate, 3-plinerved; stipules free; flowers[9] axillary

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[1] Nearly of *Carpinus*, caducous or deciduous.

[2] Small, inconspicuous.

[3] A genus hence between *Ulmus* and *Planera*, thence between *Celtis*.

[4] Spec. 4. BAUK. *Pinax.* 373 (*Pseudo-Santalum.*—LAMK. *Dict.* i. 725, (*Quercus*).—SMITH, *Trans. Linn. Soc.* (1808), 126.—RŒM. et SCH. *Syst.* vi. 304 (*Planera*).—SIBTH. et SM. *Prodr. Fl. Græc.* i. 172 (*Ulmus*).—MICHX. F. *Mém. sur le* Zelkova (1831).—LINDL. *Gardn. Chron.* (1861), 428 (*Planera*).—MIQ. *Ann. Mus. Lugd.-Bat.* iii. 66 (*Planera*).—HANCE, *Seem. Journ.* vi. 333 (*Planera*).

[5] *Inst.* 612, t. 383.—L. *Gen.* n. 1143 (part.)—J. *Gen.* 408 (part.)—GÆRTN. *Fruct.* i. 374, t. 77.—SCHKUHR. *Handb.* t. 354.—LAMK. *Dict.* iv. 135 (part.); Suppl. iii. 688; *Ill.* t. 844.—NEES, *Gen.* ii. 35.—SPACH, *Suit. à Buffon*, xi. 122.—ENDL. *Gen.* n. 1851.—PAYER, *Fam. Nat.* 168.—PL. *Ann. Sc. Nat.* sér. 3, x. 262; *Prodr.* xvii. 168 (incl.: *Mertensia* K. *Momisia* DUMORT. *Solcnostigma* ENDL.)

[6] ENDL. *Prodr. Fl. Norfolk.* 41.—BL. *Mus. Lugd.-Bat.* ii. 67.—PL. *Prodr.* 182.

[7] DUMORT. *Anal. Fam.* 17.—*Mertensia* H. B. K. *Nov. Gen. et Spec.* ii. 3, t. 103.—ENDL. *Gen.* n. 1853.—PL. *Ann. Sc. Nat.* sér. 3, x. 264; *Prodr.* 186.

[8] BL. *Mus. Lugd.-Bat.* ii. 69.

[9] Greenish or yellowish.

in new branches or to leaves or bracts of the past year, solitary, cymose or racemose-cymose.[1] (*All warm and temp. regions.*[2])

6. **Gironniera** Gaudich.[3]—Flowers diœcious (nearly of *Celtis*), 4–5-merous; sepals imbricate, persistent under the fruit, scarcely accrescent. Stamens 4, 5 (in female flower 0); filaments incurved inserted under pilose rudiment of gynæcium. Germen 1-ovulate (of *Celtis*); style branches sometimes free to base filiform elongately subulate, densely papillose, not plumose. Fruit drupaceous compressed-lenticular; exocarp scarcely fleshy; putamen crustaceous brittle, sometimes rugose without.—Trees or shrubs unarmed strigose; leaves 2-stichous, entire or serrulate penninerved; stipules subintra-axillary free rather wide convolute, closely enfolding the twig, afterwards caducous and after their fall leaving annular scars; flowers in loose or close sometimes spike-like cymes; the male often glomerulately spicate or densely crowded. (*Trop. Asia*, *Malaya*, *Pacific Islands.*[4]).

7. **Trema** Lour.[5]—Flowers (nearly of *Celtis*) polygamo-monœcious; sepals 5, in æstivation induplicate-valvate below, more or less imbricate above, in female flower generally unequal and oftener quincuncially imbricate at base. Stamens 5, inserted under pilose hypogynous disk; filaments subulate; anthers introrse. Germen (in male flower rudimentary), ovule and other characters of *Celtis*;

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[1] Subgenera in genus 4, ex. Pl. *Prodr.* scil. 1. *Euceltis* (incl.: *Lotopsis* Spach, *Leiopyrena* Spach, *Proteophyllum* Spach), stigmas entire linear, male flowers at base of leafless branches, cymoso-racemose; female flowers in axils of new leaves, solitary;—2. *Sponioceltis* (Pl.) stigmas as in preced. flowers cymose; cymes infer. male super. hermaphrod.—3. *Solenostigma* (Endl.): stigmas at apex 2-lobed or emarginate; flowers cymose.—4. *Momisia* (Dumort.) stigmas 2-fid or twice 2-fid; flowers cymose.

[2] Spec. 73-75. L. *Spec.* iv. 1478.—Cav. Icon. t. 294 (*Rhamnus*).—Lamk. Dict. iii. 388 (*Zizyphus*). — *W. Spec.*—994. — Pers. *Enchirid.* 229.—Ten. *Ind. Sem. Hort. Neap.* (1833), 15.—Pursh, *Fl. Am. Sept.* i. 200.—Rafin. *Fl. Ludov.* 25.—Roxb. *Fl. Ind.* ii. 63.—Torr. *Ann. Lyc. N. Hist.* (1827), 24.—Dcne. *Jacquem. Voy. Bot.* 150, t. 152.—Blanco. *Fl. d. Filip.* ed. 1, 197; ed. 2, 139.—Sw. *Prodr.* 53; *Fl. Ind.-Occ.* 545.—H. B. K. *Nov. Gen. et Spec.* ii. 32.—Kl. *Linnæa*, xx. 537.—Wedd. *Ann. Sc. Nat.* sér. 3, xviii. 193 (*Momisia*). — Bernh. *Furnr. Fl.* (1845), 871.—Carr *Rev. Hort.* (1868), 300.—A. Gray, *Man.* ed. 5, 443.—Chapm. *Fl. S. Unit. St.* 417.—Benth. *Fl. Hongkong.* 323; *Fl. Austral.* vi. 155.—Thw. *Enum. Pl. Zeyl.* 267.—Gren. et Godr. *Fl. de Fr.* iii. 104.

[3] *Voy. Bonite, Bot.* t. 85.—Pl. *Ann. Sc. Nat.* sér. 3, x. 338; *Prodr.* xvii. 205.—*Nematostigma* Pl. *loc. cit.* 265 (*Nemostigma*).—*Helminthospermum* Thw. *Hook. Journ.* (1854), 302, t. 9, *C.*

[4] Spec. 5, 6. Wall. *Cat.* n. 7289 (*Antidesma*). —Bl. *Mus. Lugd.-Bat.* ii. 72.—Miq. *Pl. Ind.-Bat.* i. p. ii. 222.—Thw. *Enum. Pl. Zeyl.* 267.—Teysm. et Binn. *Nat. Tijdschr. N. Ind.* xi. 363 (*Sponia*).—Benth. *Fl. Hongkong.* 324.—Seem. *Fl. Vit.* 236.

[5] *Fl. Cochinch.* (ed. 1790), 562.—Bl. *Mus. lugd,-bat.* ii. 58.—Benth. *Fl. Austral.* vi. 157. —*Sponia* Commers. ex Lamk. *Dict.* iv. 138.—Dcne. *Herb. timor.* 170.—Endl. *Gen.* n. 1852 (part.) — Pl. *Ann. Sc. Nat.* sér. 3, x. 264; *Prodr.* xvii. 195.

style branches free to base elongate stigmatose-plumose. Fruit drupaceous minute, clothed at base with persistent calyx, generally crowned with plumose emarcid style; putamen rugose or pitted. Seed nearly of *Celtis*; albumen slightly fleshy; cotyledons of curved embryo scarcely or not at all corrugate.—Unarmed trees; leaves alternate (evergreen), 3-plinerved, often tomentose; stipules free; flowers[1] in axillary cymes, 1- or 2-sexual. (*All warm regions.*[2])

8? **Parasponia** Miq.[3]—Flowers polygamo-diœcious (nearly of *Trema* or *Celtis*); sepals 5, imbricate, persistent around fruit. Stamens gynæcium and other characters of *Trema*. Fruit, drupaceous, crowned with plumose stigmata; cotyledons of curved embryo linear accumbent.[4]—Trees or shrubs;[5] leaves 2-stichous, 3-plinerved; stipules intra-axillary, united in one 2-carinate, 2-fid; flowers axillary cymose.[6] (*Indian Archipelago*, *Pacific Islands.*[7])

9. **Aphananthe** Pl.[8]—Flowers (nearly of *Celtis*) monœcious; sepals 4–6, imbricate, more or less persistent under fruit indurate, not accrescent. Stamens 4–6, inserted under rudiment of gynæcium (in female flower rudimentary or 0); filaments straight or scarcely incurved in the bud; anthers introrse oscillating, 2-rimose. Germen and ovulum of *Trema* (or *Celtis*); style afterwards 2-fid; branches subulate, longer than the germen,[9] velutinous within. Fruit drupaceous, sparsely fleshy; putamen crustaceous, somewhat rugose without; seed amphitropous; cotyledons of exalbuminous embryo spirally convolute; radicle superior somewhat incurved.—Unarmed (evergreen) trees; leaves 2-stichous, unequal at base, entire or

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[1] Minute, greenish or yellowish.

[2] Spec. about 25. Burm. *Amer. Icon.* 206, fig. 2 (*Muntingia*).—Sloane, *Jam.* ii. 80 (*Loti arbor...*).—Plum. *Gen.* 41 (*Muntingia*).—L. *Spec.* 280; *Amœn.* v. 395 (*Rhamnus*); *Fl. zeyl.* 176 (*Celtis*).—Sw. *Prodr.* 33; *Fl. Ind.-Occ.* 157 (*Celtis*).—Poir. *Dict* Suppl. iii, 689 (*Celtis*).—W. *Spec.* iv. 996 (*Celtis*).—H. B. K. *Nov. Gen. et Spec.* ii. (*Celtis*)—Roxb. *Fl. Ind.* ii. 66 (*Celtis*).—Ad. Br. *Duperr. Voy. Bot.* 212, t. 47, 215 (*Celtis*).—Bl. *Bijdr.* 486 (*Celtis*).—Schum. et Thönn. *Beskr.* 160 (*Sponia*).—Blanco, *Fl. de Filip.* ed. 2. 139 (*Celtis*).—Hochst. *Flora* (1845), 87 (*Sponia*).—Wight, *Icon.* t. 1971 (*Sponia*).—Benth. *Fl. Hongk.* 324 (*Sponia.*)——Miq. *Fl. Ind.-Bat.* i. p. ii. 215 (*Sponia*).—Thw. *Enum. Pl. Zeyl.* 267 (*Sponia*).—Seem. *Voy. Herald, Bot.* i. 413; *Fl. Vit.* 235 (*Sponia.*)—Solms, *Schweinf. Æthiop* 192 (*Sponia*).

[3] In *Plant. Junghun.* 68; *Anal. Bot. Ind.* 31.—Pl. *Prodr.* xvii. 194.

[4] "Not conduplicate."

[5] Inconspicuous minute.

[6] A genus very near to *Trema*, but sufficiently distinct by the plane imbricate æstivation of the male flower and intra-axillary concrescent stipules Pl.

[7] Spec. 2. Pl. *Ann. Sc. Nat.* sér. 3, x. 336 (*Sponia* anom.)—Bl. *Mus. Lugd.-Bat.* ii. 65, t. 36.—Seem. *Bonplandia* (1861), 259 (*Sponia*).—Miq. *Fl. Ind.-Bat.* i. p. ii. 218, t. 16.

[8] *Ann. Sc. Nat.* sér. 3, x. 265; *Prodr.* xvii. 265.—*Homoiceltis* Bl. *Mus. Lugd.-Bat.* ii. 64.—*Galumpita* Bl. *loc. cit.* 73.

[9] Shorter than in *Gironniera*.

widely serrate, penninerved or 3-plinerved at base; stipules rarely subfree, oftener growing into one, intra-axillary not enfolding, caducous; male flowers cymose in lower part of the branches; 1 or a few female sometimes intermixed; females solitary in axils of upper leaves. (*Trop. Asia*, *Indian Archipelago*, *Australia.*[1])

10. **Chætacme** Pl.[2]—Flowers monœcious (nearly of *Celtis*); sepals 5, induplicate-valvate, marcescent under fruit. Stamens 5, inserted under thin pilose disk; filaments erect subulate in bud; anthers at æstivation 2-rimose introrse, not inverted; cells at base shortly 2-saccate, longitudinally dehiscent. Germen (in male flower rudimentary) girt at base with pilose disk, 1-ovulate; style branches 2, filiform elongate densely papillose-stigmatose. Fruit drupaceous (juiceless ?); seed... ?—An evergreen tree,[3] unarmed or armed with axillary spines (abortive branches); leaves distichous elongate, at apex often setiform mucronulate, entire or spinously dentate, coriaceous penninerved, finally glabrous; petiole short; stipules connate in one wide intra-axillary enfolding the convolute leaf-bud, caducous; male flowers cymose springing either from naked base of new branches, or from perulate leaf-buds; female flowers solitary in axils of upper leaves; pedicels 1–2-bracteolate.[4] (*South Africa.*[5])

11. **Ampelocera** Kl.[6] — Flowers hermaphrodite or polygamo-monœcious; calyx gamophyllous cup-shaped, unequally 5-fid, imbricate. Stamens 10–15; filaments connate at base with perianth filiform, long exserted (sometimes short in female flower); anthers ovately oblong apiculate, introrse, 2-rimose. Germen (in male flower rudimentary or 0) free, unequally ovate, 1-locular; style erect, afterwards 2-partite; laciniæ elongately subulate divaricate, papillose within. Ovule 1, inserted under apex of cell peritropous descending; micropyle superior, protected by small obturator. Fruit baccate compressed-ovate; embryo of descending seed... ?—

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[1] Spec. 4. Kæmpf. *Amœn. Exot.* 799 (*Muk-no-ti*).—Thunb. *Fl. Jap.* 201 (*Prunus*).—Sieb. et Zucc. in *Abhandl. Münch. Akad.* iii. 223 (*Sponia*).—Sieb. *Synops.* 28 (*Celtis*).—Bl. *Bijdr.* 599 (*Cyclostemon*).—Miq. *Fl. Ind.-Bat.* i. p. ii. 224 (*Galumpita*).

[2] *Ann. Sc. Nat.* sér. 3, x. 340; *Prodr.* xvii. 209.

[3] "With habit of *Bumelia* or *Maclura*" closely connecting the *Ulmeæ* with this and other *Moreæ*.)

[4] "A genus very near *Aphananthe*, differing chiefly in its induplicate valvate calyx at æstivation" (Pl.), otherwise in habit, leaves and spines resembling the *Celastrineæ*, and also some *Bixaceæ* and *Cratægus*.

[5] Spec. 1. *C. aristata* Pl. *loc. cit.*—Harv. *Thes. Cap.* 16, t. 25.—*Celtis aristata* E. Mey.—*C. appendiculata* E. Mey.—*C. subdentata* E. Mey. Herb.

[6] *Linnæa*, xx. 541.

Trees; leaves alternate, widely serrate; stipules lanceolate membranous, deciduous; flowers in ramose glomeruliferous spikes.[1] (*Peru*, *Cuba*.[2])

II. MOREÆ.

12. **Morus** T. — Flowers monœcious or diœcious, 4-merous. Sepals 4, decussately imbricate, persistent and accrescent around fruit, closely connivent and finally succulent. Stamens 4, opposite sepals (in female flower rudimentary or generally 0); filaments inserted under short thick rudiment of gynæcium, free, inflexed in bud, finally straight or recurved; anthers introrse; cells 2, reniform, rimose. Germen (in male flower rudimentary) sessile, 1-locular; style terminal short, afterwards divided into 2 subulate papilliferous branches; ovule in cell 1, inserted under apex, descending, campylotropous; micropyle extrorsely superior. Fruit drupaceous, enclosed by succulent sepals; exocarp thin, thicker at margin; putamen testaceous. Seed descending; testa brittle; albumen fleshy; cotyledons of incurved embryo oblong; radicle ascending long cylindrico-conical.—Trees or shrubs; juice milky or opal; leaves alternate, 2-stichous, entire or dentate or lobed, unequal at base; stipules lateral free, caducous; flowers axillary or subaxillary; inflorescence solitary stipitate; receptacle in males elongate subcylindrical, on one or both sides somewhat compressed longitudinally; glomerules crowded, more numerous at margin and wanting on one or both surfaces (hence naked sulciform); female receptacle shorter ovate or oblong, also glomeruliferous; drupes with succulent calyces finally united in syncarpia. (*All trop. and subtrop. regions.*) See p. 144.

13. **Ampalis** Boj.[3]—Flowers nearly of *Morus*, 4-merous; perianth in male flower subvalvate, but in female decussately imbricate, persistent and growing succulent in syncarpia around fruit and stamens involute (of *Morus*). Germen compressed ovate; placenta thin or sometimes (*Pachytrophe*[4]) thicker and more or less prominent, 1-ovulate. Fruit drupaceous; flesh scanty; albumen of

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[1] A genus hitherto generally excluded from *Ulmeæ* on account of the number of stamens (Pl. *Prodr.* xvii. 152). But 10 stamens are oftener observed in *Holoptelea*. *Ampelocera*, in our opinion, is certainly *Celtidea*.

[2] Spec. 2. Griseb. *Cat. Pl. Cub.* 57.—Walp. *Ann.* i. 640.

[3] *Hort. Maur.* 291.—Endl. *Gen.* 1375.—Bur. *Prodr.* xvii. 250.

[4] Bur. *loc. cit.* 234.

descending seed very scanty or 0; cotyledons of curved embryo fleshy plano-convex, or sometimes (*Pachytrophe*) thinner subrotund and more or less plicate; radicle accumbent or more or less incumbent ascending.—Trees or shrubs; juice opaline; leaves alternate petiolate entire coriaceous, oftener rough beneath; stipules more or less coalescent in one semiamplexicaul, deciduous; inflorescence axillary pedunculate; receptacle very elongate spikelike marginally glomeruliferous on both sides, each surface longitudinally sulciform and destitute of flowers; bracts crowded oftener peltate.[1] (*Madagascar, Mascarene islands.*[2])

14? **Paratrophis** Bl.[3]—Flowers (nearly of *Morus* or *Ampalis*) diœcious; male sepals valvate or slightly induplicate or imbricate. Female sepals 4, herbaceous, scarcely or not at all growing around fruit, not fleshy. Germen and other characters of *Morus* (or *Ampelis*). Fruit drupaceous slightly fleshy; albumen of descending seed thin, generally thicker between the folds of the embryo. Embryo incurved; radicle ascending incumbent; cotyledons equal plicate and conduplicate, parallel or sometimes (*Uromorus*[4]) not parallel and unequally lobed.—Milky trees; alternate leaves and inflorescence of *Ampalis*; receptacles amentiform solitary or 2-nate, subcylindrical or sometimes (*Uromorus*) very long,[5] densely glomerulate. (*New Zealand, Pacific Islands.*[6])

15? **Pseudomorus** Bur.[7]—Flowers (nearly of *Paratrophis* or *Ampalis*); sepals 4, imbricate, not accrescent, persistent around base of fruit. Gynæcium and other characters of *Morus* (or *Ampalis*). Fruit drupaceous; pericarp thin slightly fleshy; embryo of descending subglobose seed thick compressed subglobose; radicle ascending accumbent; cotyledons fleshy hemispherical; albumen scanty and well conspicuous only around radicle.—A lactifluous tree;

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[1] Sect. 2, viz.: 1. *Pachytrophe*, placenta thicker; cotyledons broader plicate; radicle incumbent or more or less accumbent;—2. *Euampalis*, placenta thinner; cotyledons thicker straight; radicle accumbent. A genus apparently very near to *Morus*.

[2] Spec. 3. Poir. *Dict.* iv. 380 (*Morus*).—Jacq. *Ic. Rar.* iii. 617 (*Morus*).--Willem. *Herb. Maur.* 56 (*Morus*).—Hassk. *Pl. Jav. Rar.* 198 (*Morus*).—Bl. *Mus. Lugd.-Bat.* ii. 80 (*Streblus*).—Miq. *Fl. Ind.-Bat.* i. p. ii. 278.

[3] *Mus. Lugd.-Bat.* ii. 81.—Bur. *Prodr.* xvii. 235.—*Taxotrophis* F. Muell. *Fragm. Phytogr. Austral.* vi. 193.

[4] Bur. *loc. cit.* 236.

[5] A genus much better reduced to a section of *Ampalis*, notwithstanding the nature of its female calyx and embryo.

[6] Spec. 4. Forst. ex. Hook. f. et Raoul. *Choix de Pl.* 15 (*Trophis*); *Ann. Sc. Nat.* sér. 3, ii. 117; *Choix de Pl.* 14, t. 9 (*Epicarpurus*).—Seem. *Fl. Vit.* 258, t. 63 (*Trophis*).—Nad. *Enum. Pl. Tahit.* 43 (*Pseudomorus*).

[7] *Prodr.* xvii. 249.

leaves alternate, entire or rarely lobate, stipules, diœcious and amentous, hence glomerulate flowers and other characters of *Morus* or *Ampalis*.[1] (*Australia, Polynesia.*[2])

16. **Trophis** P. Br.[3]—Flowers diœcious; male calyx 4-partite or 4-fid, valvate. Stamens 4 (of *Morus*), inserted under obpyramidal rudiment of gynæcium. Female calyx perigynous, inserted in margin of concave cupular-saclike receptacle subovoid and gamophyllous, at contracted apex 4-lobed or 4-dentate. Germen semi-inferior; style, cell and descending ovule of *Morus* (or *Ampalis*). Fruit semi-inferior or inferior, crowned with persistent calyx, drupaceous; putamen thin parchment-like. Seed sub-globular; cotyledons of exalbuminous embryo hemispherical fleshy; radicle conical very small superior.—Lactescent unarmed trees or shrubs; leaves alternate, 2-stichous, petiolate; stipules lateral small, caducous; flowers glomerulate; inflorescence spikelike or racemiform glomerulate; racemes (spurious) simple or compound. (*Both trop. Americas.*[4])

17. **Broussonetia** Vent.[5]—Flowers diœcious (nearly of *Morus*); male sepals 4, free or connate at base, valvate. Stamens 4; filaments elastically exsilient; anthers short introrse.[6] Female calyx membranous obconico-urceolate, denticulate at apex. Germen stipitate, 1-locular; style lateral to apex subulate-filiform exserted stigmatose; micropyle of descending ovule extrorsely superior. Fruit stipitate to elongate gynophore girt at base with persistent calyx, drupaceous; mesocarp very thin at both faces, at base and margins on both sides thick fleshy; putamen crustaceous or osseous, finally free from exocarp;[7] testa of descending seed thin; cotyledons

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[1] A genus of doubtful autonomy and very probably hereafter to be reduced to a section of *Ampalis*.

[2] Spec. 1. very various in form, as *P. Brunoniana* Bur. *Ann. Sc. Nat.* sér. 5, xi. 372.—Benth. *Fl. Austral.* vi. 181.—*Morus Brunoniana* Endl. *Atakta*, t. 32.—*M. pendulina* F. Bauer, *Ic. ined. Pl. Norfolk.* t. 186, Endl. *Prodr. Fl. Norfolk.* 40.—*Streblus Brunoniana* F. Muell. *Frag.* vi. 192.—*S. pendulina* F. Muell. *loc. cit.*

[3] *Hist. Jam.* 357.—L. *Syst.* n. 1103 (part.).—J. *Gen.* 442 (part.).—Poir. *Dict.* viii. 122 (part.).—Endl. *Gen.* n. 1871 (part.).—Tréc. *Ann. Sc. Nat.* sér. 3, viii. 146.—Bur. *Prodr.* xvii. 252. *Bucephalon* Plum. *Pl. Amer.* (ed. Burm.), 55.——L. *Spec.* ed. 3, 1661.

[4] Spec. 2, 3. Sw. *Obs.* 372.—W. *Spec.* ii. 733.—Miq. *Mart. Fl. Bras. Urtic.* 159.—Griseb. *Pl. Wright. Mem. Amer. Acad.* sér. 8 (1860), 173; *Fl. Brit. W.-Ind.* 153; *Cat. Pl. Cub.* 58.—Schltl, *Linnæa*, vi. 357.—Liebm. *Vidensk. Selfskr, Kjoben.* (1851), ii. 315, 335 (*Sorocea*).—Seem. *Bonplandia*, v. 74.

[5] *Tabl.* iii. 547.—Spach, *Suit. à Buffon*, xi. 49.—Endl. *Gen.* n. 1858.——Payer, *Fam. Nat.* 172.—Bur. *Prodr.* xvii. 223.—*Papyrius* Poir. *Dict.* v. 3.—Lamk. *Ill.* t. 762.—*Stromadendrum* Pav. Herb. ex Bur. *Adansonia*, x. 734.

[6] Pollen granular in *B. papyrifera* spherical with 2 thick polar papillæ. (H. Mohl. *Ann. Sc. Nat.* sér. 2, iii. 313.

[7] And by the elasticity of the fork formed from the thick margins of the sarcocarp after the rupture of its surfaces projected to a less or greater distance. (Cfr. H. Bn. *Compt. Rend* lii. 19; *Adansonia*, i. 226, t. 8.

incurved embryo subequal oblong; radicle accumbent ascending; albumen fleshy thicker between folds of embryo. Other characters of *Morus*.—Trees; with milky or opaline juice; leaves alternate,[1] 2-stichous, caducous, often polymorphous; stipules lateral membranous, caducous; inflorescence axillary pedunculate solitary; the male amentiform (glomerulate); the female densely glomerulate on spherical receptacle; bracts interposed, truncate at clavate apex. (*South east. trop. and subtrop. Asia.*[2])

18. **Maclura** Nutt.[3]—Flowers diœcious (nearly of *Morus* or *Broussonetia*); male sepals 4, free or connate below. Stamens 4; filaments elastically exsilient, finally long exserted. Female sepals 4, free, thick, imbricate and angular by mutual compression, thicker at obtuse apex. Germen compressed sessile;[4] style simply filiform or 2-partite; the second branch very short subulate enclosed. Fruit drupaceous (mesocarp slightly fleshy), collected and enclosed in globular fleshy syncarp formed of the accrescent mutually compressed and closely approximate or coadunate calyces; putamen coriaceous or subcrustaneous; albuminous seed and embryo nearly of *Broussonetia*.—Spinous trees and shrubs; wood yellow; juice milky; leaves alternate petiolate, entire, serrate or rarely lobed; stipules lateral, caducous; male flowers on amentiform receptacle (partly naked) glomerulate or sometimes cymose; female capitate; other characters of *Broussonetia*.[5] (*Both Americas warm and temp.*[6])

19. **Caturus** Lour.[7]—Flowers diœcious (nearly of *Broussonetia* or *Maclura*); male calyx 3-fid or more rarely (*Allœanthus*[8]) 4-fid, im-

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[1] Sometimes more rarely in *B. papyrifera* opposite.

[2] Spec. 3, 4. Kæmpf. *Amœn. Exot.* 421, tab. (*Papyrus legitima*).—Seba, *Thes.* i. 44, t. 28 (*Morus*).—L. *Spec.* 1399 (*Morus*).—Thunb. *Fl. Jap.* 71 (*Morus*) —Duham. *Arbr.* ed nov. ii. 25. —Bl. *Mus. Lugd.-Bat.* ii. 85.—Sér. *Descr. et Cult. des Mûr.* 228, t. 23 (*Morus*).—Sieb. *Verh. Bat. Gen.* xii. 28.—Sieb. et Zucc. in *Abhand. d. Kœn. Akad. d. Wiss.* iv. p. iii. 221.—Miq. *Fl. Ind.-Bat.* Suppl. 417; *Ann. Mus. Lugd.-Bat.* ii. 198. —Seem. *Fl. Vit.* 246.

[3] *Gen. Amer.* ii. 233; *N.-Amer. Sylv.* i. 126, t. 37, 38.—Spach, *Suit. à Buffon*, xi. 52.—Endl. *Gen.* n. 1857.—Payer, *Fam. Nat.* 122.—Bur. *Prodr.* xvii. 226.—*Toxylon* Rafin. *Lond. Gard. Mag.* viii. 247.—*Chlorophora* Gaudich. *Freycin. Voy. Bot.* 509.

[4] Ovule often oblique descending peritropous.

[5] Sect. 2. 1° *Chlorophora*, male flowers glomerulate sessile; 2° *Eumaclura*, male flowers cymose pedicellate.

[6] Spec. 4 [of which 1 is African, viz.: *M.? excelsa* Bur. (*Morus excelsa* Welw.) apparently of another genus]. H. B. K. *Nov. Gen. et Spec.* ii. 32 (*Broussonetia*).—Mart. *Herb. Fl. Bras.* 249 (*Broussonetia*).—Sloane, *Jam.* i. p. ii. 2 (*Morus*).—Jacq. *Stirp. Select.* 247 (*Morus*).—Ser. *Descr. et Cult. des Mûr.* 231, t. 27.—R.-Del. *Bull. Soc. Agr. Hérault*, jun. 1835, c. tab. —Bl. *Mus. Lugd.-Bat.* ii. 81.—Miq. *Mart. Fl. Bras. Urtic.* 153, t. 51–54.

[7] *Fl. Cochinch.* (ed. 1790), 612 (not L.).—Seem. *Fl. Vit.* 254.—*Malaisia* Blanco, *Fl. d. Filip.* (ed. 1837), 789; (ed. 1845), 543.—Pl. in *Ann. Sc. Nat.* sér. 4, iii. 293.—Bur. *Prodr.* xvii. 221.—*Dumartroya* Gaudich. *Voy. Bonite, Bot.* t. 97.—*Cephalotrophis* Bl. *Mus. Lugd.-Bat.* ii. 75, t. 27.

[8] Thw. *Hook. Journ. Bot.* vi. 302; *Enum. Pl. Zeyl.* 263.

bricate or sub-valvate. Stamens 3, 4; anthers short introrse; cells subglobular rimose. Female calyx urceolate, at apex shortly or very shortly 4-dentate, sometimes hence fissous. Gynæcium sessile; germen 1-ovulate; style erect, presently divided into 2 branches, equal or unequal (*Allœanthus*), filiform papillose. Fruit sessile, enclosed by calyx, coriaceous fleshy; albumen 0 or scanty mucous; cotyledons of fleshy embryo equal or unequal; radicle various.—Trees or shrubs, often climbing, lactescent; leaves petiolate, 2-stichous, entire or serrate; stipules lateral, deciduous; inflorescence axillary pedunculate, solitary or 2-nate, sometimes more; the male spikelike glomerulate; female flowers capitate; bracteate.[1] (*Trop. Asia and Oceania.*[2])

20? **Cardiogyne** Bur.[3]—Flowers diœcious (nearly of *Broussonetia* or *Maclura*); calyx 4-fid, in female flower oftener thicker, imbricate.[4] Stamens 4, germen and other characters of *Caturus;* style simple very long, long-filiform and stigmatose above. Fruit collected on globular syncarp; drupes ∞, nidulant; exocarp thin; putamen crustaceous fragile. Seed exalbuminous; coat thin membranous; cotyledons of incurved embryo foliaceous wide much corrugate-conduplicate, one enveloping the other; radicle incumbent on cotyledons thick conical, slightly curved, ascending.—A spinous shrub; leaves alternate petiolate entire penninerved; inflorescence of both sexes axillary 2-nate, shortly pedunculate or sessile; receptacle globose glomerulate; flowers alternately free and bracteate clavate rather thick, at apex truncately peltate, intermixed.[5] (*Zanzibar.*[6])

21? **Plecospermum** Trec.[7]—Flowers diœcious (of *Cardiogyne* or *Broussonetia*), 4-merous; male calyx 4-fid, imbricate; female pierced at apex with very small aperture 4-denticulate. Syncarp globose fleshy enclosing free fertile and sterile achenes; embryo of exalbuminous seed fleshy; cotyledons conduplicate covering ascending radicle. Other characters of *Broussonetia* (or *Maclura*).—A spinous shrub; branches diffuse; leaves alternate petiolate entire; inflorescence of both sexes globose glomerulate, axillary, 2-nate or more rarely solitary, pedunculate; female flowers connate with each other at base.[1] (*India.*[2])

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[1] A genus very near to *Broussonetia*, *Allœanthus* intervening, and also to *Maclura*, notwithstanding the calyx of the latter is formed of free folioles. *Allœanthus* is (not without right) a section of *Maclura*, according to Miq. *Fl. Ind.-Bat.* i. p. ii. 280.

[2] Spec. 2. 3. Hook. and Arn. *Beech. Voy. Bot.* 214 (*Trophis*).—Bl. *Bijdr.* 488 (*Morus*); *Mus. Lugd.-Bat.* ii. 75 (*Malasia*).—Miq. *loc. cit.* 281 (*Cephalotrophis*).—M. Arg. *DC. Prodr.* xv. sect. ii. 906 (*Alchornia*).—Benth. *Fl. Austral.* vi. 180 (*Malaisia*).

[3] *Prodr.* xvii. 232.

[4] The female sepals very often enclose in the very thick substance of the parenchyma 2 cells (of a sterile anther ?) filled with a yellow powder. The same is more rarely the case in the male calyx of some very near genera of *Plecospermum*. The sepals thus call to mind those of the *Oxalideæ*, though thicker.

[5] A genus to be reduced perhaps to a section of *Cudrania*.

[6] Spec. 1. *C. africana* Bur. *loc. cit.*

[7] *Ann. Sc. Nat.* sér. 3, viii. 124, t. 4, fig. 121–126.—Bur. *Prodr.* xvii. 233.

22. **Streblus** Lour.[3]—Flowers diœcious[4] (nearly of *Plecospermum* or *Cardiogyne*); the males axillary glomerulate, 4-merous; stamens finally long open; the females solitary or very rarely 2–4-nate; branches of terminal style 2, long filiform. Fruit globose; calyx accrescent involucrate; pericarp parchment-like; embryo of exalbuminous seed globose; cotyledons very unequal; one enfolding the other with superior radicle.—An unarmed tree or shrub; twigs and leaves 2-stichous; leaves petiolate coriaceous; stipules lateral small, caducous; male flowers collected in axillary pedunculate glomerules, 2-bracteate; the female axillary, long pedunculate. (*East Indies*, *Java.*[5])

23 ? **Pseudostreblus** Bur.[6]—Flowers monœcious (of *Streblus*); males in axillary ramose 1-laterally cymiferous (spurious) racemes, 2-bracteate at base, 5-merous, sepals 5, ovate concave, imbricate; females solitary. Fruit . . . ? Other characters of *Streblus.*—A tree or shrub (?); leaves petiolate, 2-stichous, entire coriaceous; stipules lateral small, caducous; inflorescence axillary; the males longer with petiole.[7] (*East Indies.*[8])

24 ? **Taxotrophis** Bl.[9]—Flowers diœcious (of *Streblus*), 4-merous; the males in pedunculate shortly spikelike or capituliform glomeruliferous catkins; the females solitary. Fruit longer than slightly increased and persistent calyx; mesocarp here rather thick, thence laterally thin; embryo of exalbuminous seed subglobose; cotyledons subhemispherical fleshy; radicle very short superior.—A spinous

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[1] A genus perhaps with Maclura to be united with the preceding, of which it is a section according to Bl. (*Leptosura*) and Miq. *Fl. Ind.-Bat.* i. p. ii. 280.

[2] Spec. 1. *P. spinosum* Tréc.—Wight, *Icon.* t. 1963.—Thw. *Enum. Pl. Zeyl.* 263.—*Batis spinosa* Roxb. *Fl. Ind.* iii. 763.

[3] *Fl. Cochinch.* (ed. 1790), 614.—Bur. *Prodr.* xvii. 218.—*Trophis* Retz. *Obs.* v. 30 (not L.).—*Epicarpurus* Bl. *Bijdr.* 488.—Endl. *Gen.* n. 1855.

[4] Sometimes polygamous (Bl.).

[5] Spec. 1. *S. asper* Lour.—Bl. *Mus. Lugd.-Bat.* ii. 79, t. 30.—Thw. *Enum. Pl. Zeyl.* 264.—*S. aspera* Miq. *Fl. Ind.-Bat.* i. p. ii. 278.—*Trophis aspera* Retz. *Obs.* v. 30 (part.).—Roxb. *Fl. Ind.* iii. 761.—*T. cochinchinensis* Poir. *Dict.* viii. 123.—*T. aculeata*, Roth. *Nov. Pl. Spec.* 868.—*Epicarpurus orientalis* Bl.—Wight, *Icon.* t. 1961.—*E. asper* Steud.—*Achymus pallens* Sol.—*Tindaparua* Rheed. *Hort. Malab.* i. 87, t. 48.

[6] *Prodr.* xvii. 219.

[7] A genus scarcely distinguishable from *Streblus* by its compound spuriously racemiform inflorescence.

[8] Spec. 1. *P. indica* Bur. *loc. cit.* 220.

[9] *Mus. Lugd-Bat.* ii. 77, t. 26.—Bur. *Prodr.* xvii. 216.

milky shrub; spines axillary (ramules); leaves 2-stichous, shortly petiolate; stipules lateral small, not caducous; male inflorescence shortly stipitate; female flowers solitary, long pedunculate.[1] (*Java.*[2])

25? **Phyllochlamys** Bur.[3]—Flowers diœcious (nearly of *Taxotrophis* or *Streblus*), 4-merous; males[4] in subsessile capituliform involucrate inflorescences; anthers 4, introrse subglobose. Scales of involucre ovate concave, dry, dark-coloured. Female flower, gynæcium and other characters of *Streblus*. Fruit drupaceous, involucrate by accrescent perianth; albumen of descending laterally affixed seed pulpy, sometimes very thin; cotyledons of somewhat fleshy embryo very unequal; one conduplicate lobate enfolding the other much smaller.—A spinous shrub;[5] leaves alternate, very shortly petiolate; stipules small, 2-nate; male capitules axillary sessile glomerate 2–5; female flowers axillary solitary long-pedunculate.[6] (*East Indies*, *Java.*[7])

26. **Diplocos** Bur.[8]—Flowers diœcious (nearly of *Streblus*), 4-merous; male calyx valvate; anthers subglobose introrse; female calyx imbricate, not involucrate. Fruit in part drupaceous; putamen parchment-like; seed sometimes pulpy albuminous; embryo placed at top of albumen, cotyledons equal broad complanate, cordate at base, conduplicate; radicle long curved turned to hilum and enfolded in base of cotyledons. Other characters of *Streblus*. — A branched shrub somewhat spinous; leaves alternate subelliptic membranous, shortly petiolate; stipules small, serrate above, caducous; male flowers[9] in broken cymiferous catkins, bracteate; female in axillary (spurious) racemes, shorter than the leaf, cymosely subcorymbiform ebracteate. (*Ceylon.*[10])

27. **Dorstenia** Plum.[11]—Flowers monœcious; male oftener 2-

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[1] Better a section of *Streblus* ?

[2] Spec. 1. *T. javanica* Bl.—Miq. *Fl. Ind.-Bat.* i. p. ii. 278.—*Urtica? spinosa* Bl. *Bijdr.* 507.—*Epicarpurus javanica* Bl.

[3] *Prodr.* xvii. 217.

[4] The adult stamens are said to be furnished with elongate incurved filaments (and are so represented in Wight's figure), in the younger state they appear to us shorter and erect (after the manner of the *Artocarpeæ*), a genus hence apparently very near to *Cudrania*.

[5] With the habit and branches of *Cardiogyne*.

[6] Better a section of *Streblus*, notwithstanding the involucre of the male flower.

[7] Spec. 1. *P. spinosa* Bur. — *Epicarpurus spinosus* Wight, *Ic.* t. 1962 (part.).—*E. timorensis* Dcne, *Herb. Timor.* t. 21.—*Trophis spinosa* Roxb. *Fl. Ind.* 762.—*T. taxiformis* Spreng. *Syst.* iii. 902.—Hook. and Arn. ap. *Beech.* 215.—*T. taxoides* Heyn. *Roth. Nov. Pl. Ind.* 368.—*T. ? Heyneana* Wall. *Cat.* n. 4642.—*Taxotrophis Roxburghii* Bl. *Mus. Lugd.-Bat.* ii. 78.—Thw. *Enum. Pl. Zeyl.* 264.—Miq. *Fl. Ind.-Bat.* i. p. ii. 279.

[8] *Prodr.* xvii. 215.

[9] Green.

[10] Spec. 1. *D. zeylanica* Bur.—*Epicarpurus zeylanica* Thw. *Hook. Lond. Journ.* (1852), 1, 3, t. 2.—*E. zeylanicus* Wight, *Icon.* t. 196 (part.).—*Taxotrophis zeylanica* Thw. *Enum. Pl. Zeyl.* 264 (if *D. macrophylla* is of this genus ? ?).

[11] *Nov. Pl. Amer. Gen.* 29, t. 8.—L. *Gen.* n.

merous; sepals free or connate to a greater or less height, at apex often unequally denticulate. Stamens 2, or more rarely 1, 3; filaments inflectedly incurved, finally exsilient exserted; anthers introrse subglobose, 2-rimose. Calyx of female flower small, very small (or 0), inserted (perigynously) at mouth of receptacular cavity and closing it, with small aperture at apex. Germen (relatively to perianth quite inferior) inserted at bottom of cavity, sessile or shortly stipitate, compressed; style under apex lateral, apex exserted beyond aperture of perianth and there 2-fid; laciniæ subulate stigmatose. Ovule inserted under apex of cell and under base of style, descending, more or less campylotropal; micropyle extrorsely superior. Fruit drupaceous finally exserted from folds of receptacle; exocarp fleshy, thicker at margin, and at maturity projecting elastically beyond the crustaceous free putamen.[1] Seed exalbuminous; cotyledons of somewhat fleshy embryo subequal, unequally plicate or conduplicate enfolding the incumbent radicle.—Small shrubs or oftener perennial herbs; juice milky or opaline; rhizome often tuberous, marked with scars of leaves and thickened stipules, or more rarely with erect stem; leaves alternate various; stipules lateral, generally persistent or indurated; receptacle of axillary solitary pedunculate inflorescence dilated very various in form, either entire shortly clavato-ovoid or orbicularly peltate, sometimes unequally quadrate, obconical or shortly infundibuliform, or linear and furcate; branches oftener 2, more rarely 3–5, equal or very unequal (2 being longer); bracts ∞, unequal, imbricate, inserted at margin of receptacle, 1- or ∞-seriate; upper surface of receptacle floriferous; female flowers scattered and inserted in lowest folds of receptacle; the male more numerous perigynous as regards a central female and glomerulate around mouth of foveole; many glomerules (especially the peripherical) entirely male. (*Trop. America, Asia and Africa.*[2])

28. **Fatoua** Gaudich.[3]—Flowers monœcious, 4-merous; calyx

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209.—Lamk. *Dict.* ii. 516; Suppl. ii, 517; *Ill.* t. 83.—Spach, *Suit. à Buffon*, xi. 61.—Turp. *Dict. Sc. Nat.* Atl. t. 284.—Endl. *Gen.* n. 1860.—Bur. *Prodr.* xvii. 258.—*Sychinium* Desvx. *Mém. Soc. Linn. Par.* iv. 216.—*Kosaria* L. *Syst.* ii. p. i. 71.—Forsk. *Fl. Æg.-Arab.* 164; *Ic.* t. 20.

[1] Cfr. H. Bn. *Compt. Rend. Ac. Sc. Par.* lxx. 799; *Adansonia*, ix. 318.

[2] Spec. about 45. L. *Spec.* ed. 3. i. 176.—W. *Spec.* i. p. ii. 682.—Jacq. *Ic. Rar.* iii. 18. t. 614.—Wendl. *Rœm. Arch.* i. 51.—Rœm. et. Sch. *Syst.* iii. 472; *Mantiss.* iii. 316.—Spreng. *Syst.* iii. 777.—Griseb. *Fl. Brit. W.-Ind.* 153.—Moric. *Pl. Nouv. Amér.* 90. t. 58.—Thw. *Enum. Pl. Zeyl.* 264.—Miq. *Mart. Fl. Bras. Urtic.* 159. t. 55–61.—Hochst. *Flora* (1844), 108.—Wight, *Icon.* vi. n. 1964.—Hook. f. *Bot. Mag.* t. 5908.—Welw. *Trans. Linn. Soc.* xxvii. 70.—Schweinf. *Bot. Zeit.* xxix. 332.—Walp. *Ann.* i. 732. *Bot. Mag.* t. 5795, 5908.

[3] *Freycin. Voy. Bot.* 509; *Voy. Bonite. Bot.* t. 84.—Endl. *Gen.* 278.—Bur. *Prodr.* xvii. 255.

4-fid, valvate. Stamens 4; filaments inflexed in bud finally erect; anthers introrse rotundate, 2-rimose. Germen very shortly stipitate; style lateral very short, afterwards 2-fid; lobes pilose very unequal; one very long filiform; the other (superposed to cell) very short subulate; ovule in cell 1, descending and inserted under the apex; micropyle extrorsely superior. Fruit clothed at base with persistent calyx, drupaceous; putamen chartaceous; exocarp laterally and below much thicker and finally free from putamen. Seed descending; testa membranous; albumen fleshy; cotyledons of central embryo flat, curved at base; radicle accumbent ascending and subequal to cotyledons.—An herb,[1] sometimes shrubby at base;[2] stem simple or branched from base; branches diffuse or ascending; leaves alternate petiolate; stipules lateral; flowers axillary; inflorescence androgynous pedunculate cymose-capitate solitary or 2-nate; female flowers terminal and dichotomous. (*Japan, trop. and subtrop. Oceania.*[3])

29. **Bleekrodea** Bl.[4]—Flowers monœcious (nearly of *Fatoua*), 4–5-merous; male calyx valvate, 4–5-fid. Stamens 4–5; filaments incurved at æstivation, inserted under rudiment of gynæcium; anthers introrse, 2-dymous. Female calyx urceolate or tubular, 4-dentate. Germen 1-ovulate; style lateral; branches 2, very long setaceous stigmatose, equal or somewhat unequal. Fruit drupaceous, enclosed by urceolate calyx; exocarp unequal, thick below and laterally hence to style; putamen chartaceous. Seed subglobose, sometimes flattened above; cotyledons of exalbuminous embryo very unequal; one very small squamiform; radicle small incumbent.—Unarmed lactescent shrubs; leaves alternate, very shortly petiolate, entire or dentate, sometimes lobed, penninerved veined; stipules lateral; flowers in axillary 1–2-sexual cymes; the female solitary in dichotomy of ramules; the male numerous. (*Borneo, Madagascar.*[5])

30. **Sloetia** Teysm. and Binn.[6]—Flowers monœcious (nearly of *Bleekrodea*); male 3-merous; calyx valvate. Sepals of female calyx

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[1] Habit quite of *Urticæ*.

[2] Pubescence 2-morphous; hairs at base coarse.

[3] Spec. 1. *F. japonica* Bl. *Mus. Lugd-Bat.* ii. t. 38.—*F. pilosa* Gaudich.—*F. aspera* Gaudich.—*F. subcordata* Gaudich.—*F. lanceolata* Dcne. *Herb. Timor.* 492.—*Urtica japonica* Thunb. *Fl. Jap.* 70.—*U. manillensis* Walp.—*Parietaria aspera.* Leschen.—*Fleurya glechomæfolia* Miq. *Zoll. Verz.* 103, 106.—*F. globulifera* Miq. *loc. cit.*

[4] *Mus. Lugd.-Bat.* ii. 87. t. 28.—Bur. *Prodr.* xvii. 254.

[5] Spec. 2. Bl. *loc. cit.*

[6] *Tydschr. Nat. Ver.* (1863).—Kurz. in *Journ. Linn. Soc.* viii. (1864), 168. t. 13.—Bur. *Prodr* xvii. 257.

4, decussately imbricate. Gynæcium of *Bleekrodea*; style branches very long filiform. Fruit of *Bleekrodea*, enclosed by calyx; embryo of exalbuminous (?) seed fleshy; cotyledons unequal submembranous thin; radicle rather long thick ascending.—A lactescent tree; leaves alternate entire; stipules amplexicaul;[1] inflorescence 2-sexual; receptacle long amentiform flat linear; one surface naked; the other bearing very crowded (minute-flowered) male glomerules; one female here and there in very few glomerules (or 1) central and exserted. (*Java.*[2])

31? **Trymatococcus** Pœpp. and Endl.[3]—Flowers monœcious; male calyx 3–4-fid. Stamens 3, 4, enclosed; filaments membranous dilated connate at base, at æstivation inflexed or sometimes suberect; anthers short; cells small subglobose, laterally or introrsely rimose. Gynæcium nearly of *Sloetia* (or *Dorstenia*); calyx 0; germen imbedded within central cavity of obcampanulate or urceolate receptacle, relative to glomerules of male flowers inferior. Fructiferous receptacle crowned at apex with the persistent remains of the male flowers and covering the fruit below adnate to itself within, externally slightly hirsute. Seed descending globose; cotyledons of exalbuminous embryo very unequal; one very small nearly flat; the other very large and thick subglobose; radicle short superior.—Trees or shrubs;[4] leaves distichous rugulose, unequal at base, shortly petiolate; stipules lateral small free connivent, caducous; scar linear transverse; capitules axillary pedunculate, solitary or 2–6, ovoid-globose or turbinate-subcampanulate, perforated at apex, scabrid without, enclosing single central female flower within; male flowers inserted in crowded bracteate glomerules around the mouth of the receptacle and finally persistent to top of fructiferous receptacle.[5] (*North. Brazil, trop. west. Africa.*[6])

III. ARTOCARPEÆ.

32. **Artocarpus** L.—Flowers monœcious; male calyx 2–4-fid or sometimes partite, imbricate. Stamen 1; filament central erect;

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[1] After the manner of nearly all *Artocarpeæ*.

[2] Spec. 1. Miq. *Fl. Ind.-Bat.* Suppl. i. 172, 419 (*Artocarpus*).

[3] *Nov. Gen. et Spec.* ii. 30, t. 142.—Endl. *Gen.* n. 1863¹.—Tréc. *Ann. Sc. Nat.* sér. 3, viii. 142.—Bur. *Prodr.* xvii. 278.

[4] "Not milky."

[5] A genus hence very near to *Dorstenia*, differing only in the single central female flower, whence from stamens sometimes (at least in American species) scarcely inflexed, allied to some *Artocarpeæ*.

[6] Spec. 2, of which one is African. H. Bn. *Adansonia*, xi. 300.

anther erect, 2-locular, 2-rimose. Female flowers imbedded in long tubular foveoles of receptacle; calyx short, inserted (perigynously) at top of margin of tube, gamophyllous, perforated at apex. Germen inserted at bottom of tube, sessile or shortly stipitate, free, 1-locular (or more rarely 2–3-locular); style lateral ventral erect, at apex enclosed or exserted, apex simple or 2–3-lobed stigmatose. Ovule in cells 1, inserted under the (sometimes free) apex of erect placenta, descending, anatropous; micropyle extrorsely superior, sometimes closed by short process of placenta. Syncarp spherical or oblong, and consisting of the more or less increased fleshy farinose receptacle enclosing true (sometimes abortive) fruit. Fruit drupaceous very slightly fleshy, finally dry, oftener 1-spermous; coat of descending seed thin; cotyledons of incurved exalbuminous embryo unequal; radicle short superior.—Lactifluous trees; wood soft; leaves alternate, entire or variously incised; stipules 2, lateral connate in one supra-axillary enfolding the top of the branch deciduous; scar linear annular; flowers on distinct glomerulate receptacles; receptacle of males spikelike cylindrical or clavate, bearing externally sessile flowers intermixed with crowded bracts and bracteoles, peltate at apex (or 0); receptacle of females and fruit enfolding carpels in tubular radiating foveoles, externally rugulose with projecting calyces perforated at apex. (*Trop. Asia and Oceania.*) See p. 151.

33? **Acanthinophyllum** ALLEM.[1] — Flowers diœcious, male naked, 1-androus; stamens intermixed with peltate bracts. Female calyx urceolate, perforated at apex. Germen in early age superior, 1-locular; style thick enclosed, at apex stigmatose divaricately 2-lobed; ovule 1, descending anatropous, micropyle extrorsely superior. Syncarp composed of enclosed fleshy semi-inferior fruits and persistent perianths. Seeds exalbuminous; cotyledons of straight fleshy embryo thick equal; radicle short superior.[2]—A lactifluous tree; leaves alternate spinosely dentate; stipules and other characters of *Artocarpus*; receptacles of male flowers amentiform cylindrical; of the female (glomeruliferous ?) and fruit spherical.[3] (*Brazil.*[4])

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[1] *Revista Brasil.* i. 368, c. ic. (1858).—BUR. *Prodr.* xvii. 281.

[2] "Berries of a bright reddish golden colour, slightly puberulous, united in a syncarp embryo milky greenish azure." (ALLEM).

[3] A genus, hence, it appears, allied to *Artocarpus*, also, notwithstanding the form of the female receptacle, to *Pseudosorocea* and *Sahagunia*. The place in the order of this race, unknown to us hitherto, doubtful.

[4] Spec. 1. *A. strepitans* ALLEM. *loc. cit.* (vulg. *Bainha de Espada*).

34. **Parartocarpus** H. Bn.[1]—Flowers diœcious (nearly of *Artocarpus*); male inflorescence axillary globose pedunculate; bracts few, inserted at top of peduncle, unequal short and forming a small involucre under the base of the receptacle. Flowers crowded naked, 1-androus, intermixed with bracts thickened at apex; filament short erect; anther sub-basifixed, 2-locular. Female flower... ?—A tree; leaves alternate petiolate; stipules 2, lateral, very caducous;[2] other characters of *Artocarpus*.[3] (*Borneo*.[4])

35. **Treculia** Dcne.[5]—Flowers polygamo-diœcious,[6] capitate in globose 1- or sometimes 2-sexual receptacles. Male calyx gamophyllous, tubular or obconico-campanulate. Stamens 2 (*Pseudotreculia*[7]) or 3, 4; filaments erect, sometimes dilate (*Pseudotreculia*), inserted around small (or 0) rudiment of gynæcium; anthers introrse or extrorse.[8] Female calyx 2–4-phyllous, sometimes small (or 0); germen imbedded in foveoles of receptacle, 1-ovulate; branches of erect 2-fid style stigmatose thick subulate recurved. Syncarp globose (sometimes wide) enclosing numerous carpels; embryo of exalbuminous seed fleshy thick; cotyledons unequal; one much larger incurved enfolding the other smaller straight; radicle superior short ascending.[9]—Trees; alternate leaves and other characters of *Artocarpus*; capitules axillary, solitary or 2-nate; flowers as in *Atrocarpus* inserted and intermixed with bracts apically peltate or glandular-fimbriate. (*Trop. west. Africa*.[10])

36? **Bagassa** Aubl.[11]—Flowers diœcious; male... ? Female calyx subcylindrical; sepals 4, thickly fleshy, valvate and connivent in tube, obtuse at apex. Germen substipitate (of *Artocarpus*); style lateral, afterwards 2-fid; laciniæ subequal or unequal linear-subulate erect enclosed. Ovule descending anatropous; micropyle extrorsely superior. Fruit[12] shortly stipitate obovately oblong drupaceous; pulp scanty; putamen thin fragile. Seed descending; albumen scanty; cotyledons of curved embryo oblong-elliptical subfoliaceous; radicle accumbent descending.—Lofty trees; leaves opposite wide, 3-lobed; stipules 2 on each side, interpetiolate, deciduous; syncarps globose axillary.[1] (*Guiana.*[2])

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[1] *Adansonia*, xi. 294.

[2] Scars certainly not annular.

[3] A genus of uncertain place, from its female flower being unknown, certainly very near *Artocarpus*, but quite distinct by its defect of male perianth and involucre.

[4] Spec. 1. *P. Beccarianus* H. Bn. *loc. cit.*

[5] Tréc. *Ann. Sc. Nat.* sér. 3, viii. 108, t. 3, fig. 86–99.—Bur. *Prodr.* xvii. 285.—*Meyropeltis* Welw. Herb. (Hook.).

[6] Improperly said to be monœcious by Decaisne (*loc. cit.* not.) because some sterile male flowers were intermixed with the germens in the female syncarp and imperfectly dissected by him.

[7] H. Bn. *Adansonia*, xi. 292.

[8] In *T. acuminata* H. Bn. (*loc. cit.*), laterally or oftener extrorsely, and above subintrorsely rimose; in the male capitules of *T. africana* introrse, in the (sterile) anthers of the female syncarp extrorse and much shorter.

[9] "Cotyledons incumbent." (Dcne). We have seen the radicle not at all incumbent.

[10] Spec. 2 (imperfectly known). Hook. f. *Bot. Mag.* t. 5986.—H. Bn. *Adansonia, loc. cit.* n. 136.

[11] *Guian.* ii. Suppl. 15, t. 376.—Bur. *Prodr.* xvii. 285.

[12] "Aurantii forma." (Aubl.).

37. **Cudrania** Tréc.[3]—Flowers diœcious; sepals 4, free, imbricate. Stamens 4, opposite, sometimes at base coherent with sepals, inserted around acute rudiment of gynæcium. Germen and other characters of *Artocarpus*; style branches 2, very unequal; one very short denticuliform; the other slender elongate, at apex filiform stigmatose. Syncarp globose, composed of crustaceous, ovately lenticular, 2-valvate capsules, with persistent stipate sepals; testa of amphitropous seeds thin; albumen fleshy; cotyledons of plicate embryo rather thick contortuplicate subequal; radicle superior long. Spinous shrubs, oftener climbing; leaves alternate entire petiolate, oblong or obovate, acuminate or mucronate; stipules 2 axillary, connate at base, deciduous; flowers capitate; capitules globose (glomeruliferous) pedunculate axillary, 2-nate. (*South east. Asia*, *Malaya*, *Australia*, *New Caledonia.*[4])

38. **Helianthostylis** H. Bn.[5]—Flowers diœcious (or monœcious?) male calyx obconical membranous, imbricate, 4-fid. Stamens 4, opposite lobes of calyx; filaments short erect, finally elongately exserted, at base connate with each other and with stipes of gynæcium; anthers short, extrorsely rimose; connective suborbicular.[6] Germen sterile effete, produced upwards to a style very long exserted accrescent and very slender somewhat hispid. Female flower . . . ? Fruit globose; pericarp thin fragile, externally scabrid? testa of subglobose seed thin; cotyledons of straight exalbuminous embryo 2, plano-convex or sometimes 3, equi-angular fleshy; radicle superior very short.—A tree (?); leaves alternate (2-stichous?) petiolate; stipules small connivent;[7] flowers axillary capitate; capitules globose, shortly pedunculate, involucrate with few bracts[8] at base. (*North. Brazil.*[9])

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[1] A genus of somewhat uncertain place from the male flowers and stamens being unknown, but much resembling *Maclura*.

[2] Spec. 1. v. 2 (Bur.).

[3] *Ann. Sc. Nat.* sér. 3, viii. 122, t. 3, fig. 76–85.—Bur. *Prodr.* xvii. 285.—*Cudranus* Rumph. *Herb. Amboin.* v. 22, t. 15, 16.

[4] Spec. 5, 6. W. *Spec.* iv. 735 (*Trophis*).—Roxb. *Cat. Wall.* (*Batis*).—Miq. *Pl. Jungh.* 44; *l. Verz.* ii. 90; *Fl. Ind.-Bat.* i. p. ii. 280 (*Maclura*), 290 (*Cudranus*).—Thw. *Enum. Plant. Zeyl.* 262 (*Cudranus*).—Bl. *Mus. Lugd.-Bat.* ii. 83 (*Maclura*).—Bur. *Ann. Sc. Nat.* sér. 5, xi. 377 (*Cudranus*).—Benth. *Fl. Austral.* vi. 178.

[5] *Adansonia*, xi. 299.

[6] Dark coloured.

[7] Scars transverse, not confluent.

[8] Spec. 1. *H. Sprucei* H. Bn. *loc. cit.*

[9] *Prodr.* 129, t. 28; *Fl. Per.* 257.—Endl. *Gen.*

39. **Olmedia** R. and Pav.[10]—Flowers diœcious ; male calyx more or less deeply 4-fid ; lobes valvate or slightly imbricate. Stamens same in number opposite; filaments central or inserted around minute rudiment of gynæcium, free, straight or incurved at apex ; anthers incumbent, finally introrse, 2-locular, 2-rimose. Female flower in polyphyllous involucre solitary free; bracts of involucre unequal, imbricate in many series. Calyx conical gamophyllous, prolonged upwards to a tubular neck, 4-dentate at apex. Germen free sessile unequal, prolonged at apex to a narrow slender style, afterwards 2-fid ; laciniæ linear elongate recurved, papillose at subulate apex. Fruit dry, indehiscent, covered with fleshy perianth; seed . . . ?—Lactescent trees; leaves alternate petiolate, entire or remotely dentate or sinuate, sometimes somewhat rough or pubescent ; stipules 2, amplexicaul oblong imbricate sericeous ; flowers axillary ; the males ∞ on a small flat or slightly convex receptacle ; bracts of involucre ∞, pluriseriate at margin, imbricate ; the females solitary in their own involucre. (*Trop. America.*[1])

40. **Antiaris** Lesch.[2] — Flowers monœcious; male calyx 4-phyllous ;[3] folioles subspathulate, dilate at apex, decussately imbricate. Stamens equal in number and opposite to sepals ; filaments short erect free ; anthers erect oblong, extrorsely 2-rimose. Female flower destitute of proper calyx ; germen 1-locular ; ovule inserted under apex descending ; style branches 2, equal subulate recurved, stigmatose at attenuate apex. Fruit drupaceous, adnate within to accrete receptacle ; embryo of descending seed exalbuminous ; cotyledons thick plano-convex ; radicle short superior.—Lactescent trees or shrubs ; leaves alternate, 2-stichous, penninerved, oftener serrate petiolate ; stipules lateral subaxillary, free, not amplexicaul ; flowers axillary ; receptacle of males 2-nate or more orbicular-disciform stipitate, glomeruliferous above and involucrate with crowded short marginally imbricate bracts ; of females oftener

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n. 1863.—Tréc. *Ann. Sc. Nat.* sér. 3, viii. 127 (part.), t. 2, fig. 69, 72–75.—Payer, *Fam. Nat.* 172.—Bur. *Prodr.* xvii. 285.

[1] Pers. *Enchirid.* ii. 612.—Spreng. *Syst.* iii. 903.—Pœpp. et Endl. *Nov. Gen. et Spec.* ii. 30, t. 143, 144, 146.—Kl. *Linnæa*, xx. 523.—Miq. *Mart. Fl. Bras. Urtic.* 113 (part.).

[2] *Ann. Mus.* xvi. 470, t. 22.—R. Br. *Gen. Rem.* 70 ; *Flind. Voy.* ii. 602, t. 5 ; *Misc. Works* (ed. Benn.), i. 78.—Benn. *Horsf. Pl. Jav. Rar.* 52, t. 13.—Spach, *Suit. à Buffon*, xi. 64.—Bl. *Rumphia*, i. 56, 172, t. 22, 23, 54.—Endl. *Gen.* n. 1862.—Tréc. *Ann. Sc. Nat.* sér. 3, viii. 142, t. 6, fig. 158-168.—Payer, *Fam. Nat.* 173.—Bur. *Prodr.* xvii. 286.—*Lepurandra* Nimm. *Grah. Cat. Bomb. Pl.* 193.

[3] Male flower sometimes rarely 3-merous.

solitary subsessile piriform, adnate to middle of germen in central cavity, and finally covering fruit, externally above the middle surrounded by alternate imbricate bracts. (*Tropical Asia and Oceania.*[1])

41. **Pseudolmedia** Tréc.[2]—Flowers monœcious or diœcious; males composed of ∞ stamens inserted in an orbicular discoid or rather concave involucrate receptacle; filaments free; anthers oblong, sometimes penicillate at apex, subsagittate at base. Female flowers solitary central in polyphyllous involucre; calyx tubular or ovoid, perforated only at apex and there entire or shortly denticulate. Germen in part inferior and adnate to a greater or less height to the calyx, free at conical apex; style lateral erect enclosed or passing through the mouth of the calyx, entire or bifid; legs stigmatose. Ovule 1, inserted under apex of cell, descending, anatropous; micropyle extrorsely superior; or more rarely inserted laterally to linear hilum; micropyle superior.[3] Fruit enclosed by calyx, indehiscent; seed descending or long adnate laterally to pericarp; cotyledons of fleshy embryo very unequal; one very small; radicle short superior.—Trees or shrubs, often pubescent or hirsute; leaves petiolate or subsessile distichous; stipules lateral conniventl imbricate amplexicaul; scar linear transverse; inflorescence axillary, solitary or fasciculate; bracts of male involucre ∞, imbricate, subspathulate unequal; the interior longer and narrower; stamens intermixed with bracts sometimes setaceous hirsute; bracts of female involucre same in form or shorter. (*Trop. central and south America.*[4])

42. **Castilloa** Cervant.[5]—Flowers monœcious (nearly of *Pseudolmedia*), collected in distinct subplane or induplicate reniform receptacles, involucrate with crowded imbricate bracts; the males consisting of ∞ stamens, destitute of perianth. The female flowers closely glomerulate on common receptacle; calyx 4-phyllous. Germen semi-inferior, 1-ovulate; style thin cylindrical, 2-fid at apex; legs

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[1] Spec. 5, 6. Rumph. *Herb. Amboin.* ii. 87 (*Ipo*).—Hook. *Comp. to Bot. Mag.* i. 310, t. 17. —Wight, *Icon.* t. 1958.—Miq. *Zoll. Verz.* p. ii. 90, n. 3; *Fl. Ind.-Bat.* i. p. ii. 291; Suppl. i. 173, 423.—Thw. *Enum. Pl. Zeyl.* 263, 427.—Seem. *Bonplandia*, ix. 259; x. 3; *Fl. Vit.* 252, t. 72.—Benth. *Fl. Austral.* vi. 179.

[2] *Ann. Sc. Nat.* sér. 3, viii. 128, t. 5, fig. 149–157.—Payer, *Fam. Nat.* 173.—Bur. *Prodr.* xvii. 286.

[3] In *P. hirsuta* H. Bn. the umbilicus of the ovule and seed is observed to be vertically very linear-elongate after the manner of *Pourouma.*

[4] Spec. 5, 6. Pœpp. et Endl. *Nov. Gen. et Spec.* ii. 31 (*Olmedia*).—Miq. *Mart. Fl. Bras. Urtic.* 116.—Griseb. *Fl. Brit. W.-Ind.* 152.—H. Bn. *Adansonia*, xi. 295.

[5] *Supplem. à la Gaz. de Literat. Mexico*, 2 jul. 1794.—Trec. *Ann. Sc. Nat.* sér. 3, viii. 136, t. 5, fig. 139–148.—Bur. *Prodr.* xvii. 286.

linear subulate compressed, somewhat spirally twisted, stigmatose. Fruit drupaceous, finally sub-dry, sometimes adnate with calyx; seed exalbuminous; cotyledons of subglobose embryo thick subequal; radicle short superior.—Lactescent trees generally pubescent; leaves distichous, unequal at base; stipules connate in one supra-axillary oblong-acute; inflorescences axillary stipitate, fasciculate or rarely few or solitary, 1-sexual. (*Central America, Cuba.*[1])

43 ? **Helicostylis** Tréc.[2]—Flowers diœcious (nearly of *Castilloa*); the males crowded in polyphyllous involucre sessile; the females ∞ on common receptacle. Male calyx 4-phyllous. Stamens 4, oppositipetalous; anthers extrorse. Female calyx 4-phyllous. Germen relative to calyx inferior and hence adnate to foveoles of receptacle; ovule, etc., of *Castilloa*; style branches 2, linear subulate, compressed, much twisted spirally.—A lofty tree; leaves distichous; stipules 2, axillary acuminate subamplexicaul; inflorescences, etc., of *Castilloa*;[3] folioles of involucre close deltoid, in many places imbricate. (*Guiana, north. Brazil.*[4])

44 ? **Noyera** Tréc.[5]—Flowers diœcious (nearly of *Castilloa*); males . . . ? Female flowers ∞ (15–30), collected on a common subplane receptacle involucrate with imbricate pluriseriate bracts, imbedded in its foveoles; calyx urceolate, with small perforation at apex. Germen semi-inferior, 1-locular; ovule inserted a little below apex of cell, descending; micropyle extrorsely superior; style branches 2, filiform subulate. Fruit, etc., of *Castilloa*; coat of descending seed membranous (fuscate); cotyledons of subglobose exalbuminous embryo thick hemispherical subequal; radicle very short superior.—A ferruginous tomentose tree; leaves distichous; stipules axillary opposite amplexicaul; scars annular; female inflorescences axillary solitary subsessile.[6] (*French Guiana.*[7])

45. **Naucleopsis** Miq.[8]—Flowers diœcious (nearly of *Castilloa*);

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[1] Spec. 1 (v. 2 ?). Coll. *Rep. on Caoutch.* 11, 12, t. 2, 3 (vid. p. 176, note 2).

[2] *Ann. Sc. Nat.* sér. 3, viii. 134, t. 5, fig. 132–135.—Bur, *Prodr.* xvii. 287.

[3] A genus certainly very near *Castilloæ*; the spiral twisting of the style being much more decided.

[4] Spec. 1. *H. Pœppigiana* Tréc. *loc. cit.*—Miq. in *Mart. Fl. Bras. Urtic.* 118, t. 35, iii. iv. —*Olmedia Pœppigiana* Mart. *Herb. Fl. Bras.* n. 629.—*O. tomentosa* Pœpp. et Endl. *Nov. Gen. et Spec.* ii. 32, t. 145.—*O. affinis* Steud. *Nomencl.*

[5] *Ann. Sc. Nat.* sér. 3, viii. 135.—Bur. *Prodr.* xvii. 286.

[6] A genus somewhat uncertain from the male flower not being known, but certainly very near *Castilloa*.

[7] Spec. 1. *N. Guianensis* Tréc. *loc. cit.*—Miq. *Mart. Fl. Bras. Urtic.* 119.

[8] *Mart. Fl. Bras. Urtic.* 120, t. 35, fig. 1.—Bur. *Prodr.* xvii. 282.

males . . . ? Female flowers[1] crowded on convex receptacle pluriseriately imbricate at base, the outermost impoverished. Calyx tubularly urceolate thickly coriaceous, at mouth 4–5- or more rarely 6-dentate; teeth reflexed. Germen quite inferior completely imbedded in and in every part adnate to foveoles of receptacle; stigmatose branches of enclosed style 2, filiform elongate exserted; ovule inserted near apex of cell descending anatropous; micropyle extrorsely superior. Fruit . . . ?—A tree; leaves distichous costate; stipules axillary, 2-nate, caducous; female receptacles axillary solitary subsessile.[2] (*North. Brazil.*[3])

46. **Maquira** Aubl.[4]—Flowers diœcious (nearly of *Castilloa*); male calyx 4-phyllous; folioles decussately imbricate. Stamens 4, opposite; filaments free, erect before anthesis; anthers introrse, 2-rimose. Female flowers crowded, placed (not imbedded) on common receptacle; germen inferior relatively to gamophyllous 4-lobed calyx; lobes of thick style short stigmatose. Other characters of *Castilloa.* Fruit composed of free capitate drupes attenuate at base; seed . . . ?—A moderate-sized tree; leaves distichous coriaceous, unequal at base, shortly petiolate; stipules minute, 3-angular; receptacles axillary; males disciform, slightly depressed above, involucrate with crowded pluriseriate imbricate bracts; the fructiferous capitate. (*Guiana.*[5])

47. **Perebea** Aubl.[6]—Flowers diœcious (nearly of *Maquira*); receptacle suborbicular, at first slightly concave, afterwards plane and reflexed, convex above; bracts of involucre ∞, inserted at margin of receptacle and imbricate in many places. Calyx tubular, at base sometimes compressed and 4-dentate at apex. Gynæcium free; germen (as regards gamophyllous calyx superior) 1-ovulate; lobes of style 2, short and other characters of *Maquira.*—Trees; leaves distichous; flowers of both sexes on broad patulous receptacle not imbedded. (*Central America, Guiana.*[7])

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[1] "Dense, subcoherent at base, very rigidly subligneously bracteate." (Miq.).

[2] Is *Ocgodeia* Bur. (*Prodr.* 282), *Naucleopsis glabra* Spruce (Herb.), n. 2793, a north Brazilian race described as: female flowers naked, germen inferior, style thick; stigmata 2, linear rather thick, the terminal half rough with unequal tubercles (whence the generic name), and numerous abortive flowers reduced to ovoid-pyramidal perianth, fertile flowers being interposed and covering the receptacle; a section of this genus.

[3] Spec. 1. *N. macrophylla* Miq. *loc. cit.*

[4] *Guian.* Suppl. 36. t. 389.—Bur. *Prodr.* xvii. 286.

[5] Spec. 1. *M. guianensis* Aubl. *loc. cit.*—*Perebea laurifolia* Tréc. *Ann. Sc. Nat.* sér. 3. viii. 133, t. 5, fig. 136–138.—Miq. *Mart. Fl. Bras. Urtic.* 117, n. 2.—? *Olmedia ? grandifolia* Tréc. *loc. cit.* 128 (Bur.).

[6] *Guian.* ii. 952, t. 361.—J. *Gen.* 402.—Endl. *Gen.* n. 1874.—Tréc. *Ann. Sc. Nat.* sér 3, viii 132 (part.).—Bur. *Prodr.* vii. 286.

[7] Spec. 2, of which 1 is Panaman (Bur.).

48. **Lanessania** H. Bn.[1]—Flowers monœcious collected on unequally obpyramidal angular receptacle; males crowded in glomerules on the nearly flat upper base of the receptacle. Female flower 1 central; germen inferior, adnate within to centre of receptacle; style apical within central vertical canal erect and free, afterwards 2-fid in subulate laciniæ exserted beyond male flowers; ovule 1, subapical in cell descending; micropyle extrorsely superior. Fruit...?—A tree (?); leaves alternate petiolate; stipules lateral free unequally 3-angular; inflorescence axillary pedunculate. Bracts ∞, unequal, imbricate around upper orbicular base of receptacle in many cases as an involucre; fewer inserted around apex of receptacle below; a few interposed remotely alternate very unequal and inserted here and there on the slightly prominent longitudinal walls of the receptacle. (*North. Brazil.*[2])

49. **Scyphosyce** H. Bn.[3] — Flowers monœcious, crowded in androgynous inflorescences; female 1, central; males ∞, perigynously inserted in throat of regularly obcampanulate poculiform receptacle, sub-1-seriate; lobes of involucre few (4–5) broad obtuse membranous, imbricate, finally (calyx-like) expanded. Male calyx long obconically tubular, at base long attenuated and shortly stipitate, above finally subentire truncate. Stamen 1; filament central, inserted at bottom of calyx, erect and exserted; anthers basifixed oblong, 2-rimose.[4] Female calyx (?) 2-phyllous;[5] folioles sessile, imbricate. Germen inserted at bottom of receptacle sessile, oblong-conical, 1-locular; ovule 1, inserted under apex of cell descending; micropyle extrorsely superior; style terminal erect, 2-fid at apex; lobes subulate recurved stigmatose. Fruit...?—A glabrous shrub (?); leaves alternate (2-stichous?), at base long-narrow, shortly petiolate, oblong-subspathulate acuminate crenate penninerved, unequal at base; stipules (equal to or longer than petiole) acute, imbricate; inflorescence axillary pedunculate. (*Trop. west. Africa.*[6])

50. **Bosqueia** Dup.-Th.[7]—Flowers monœcious; receptacles obliquely obconical; males crowded, inserted on oblique upper base; stamens intermixed with unequal imbricate bracts; the exterior

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[1] *Adansonia*, xi. 298; *Bull. Soc. Linn. Par.* 49.

[2] Spec. 1. *L. turbinata* H. Bn. *loc. cit.*—*Brosimum turbinatum* Spruce, Herb.

[3] *Adansonia*, xi. 293.

[4] Nigrescent.

[5] Gynæcium bracteate at base ?

[6] Spec. 1. *S. Manniana* H. Bn. *loc. cit.*

[7] Ex. H. Bn. *Adansonia*, iii. 335, t. 10; viii. 72, t. 4.—Bur. *Prodr.* xvii. 288.

wider involucrate;[1] filaments free; anthers introrse, 2-rimose. Germen inferior subcentral, entirely adnate to receptacle; style erect, somewhat dilated at base, 2-fid above; branches linear, stigmatose within; ovule 1, inserted under apex of cell, descending; micropyle extrorsely superior. Fruit inferior, externally surrounded by adnate urceolate receptacle, at apex crowned with remains of bracteoles and stamens; albumen of descending seed copiously fleshy; embryo subapical very small (?).—Trees or shrubs; leaves alternate petiolate, oftener entire coriaceous penninerved glabrous; stipules intra-axillary amplexicaul, caducous; inflorescences axillary solitary pedunculate, in early age budlike and perulate, more or less lateral, finally subterminal. (*Trop. east. littoral and insular Africa.*[2])

51. **Piratinera** Aubl.[3]—Flowers monœcious; males crowded entirely covering common globose receptacle; female 1 (or very rarely 2) adnate within to top of receptacle. Stamens ∞, destitute of calyx, intermixed with peltate bracts; filaments filiform erect; anthers dorsifixed to thick connective; cells 2, lateral, rimose, or peltate and dehiscent all round an annular cleft. Germen partly inferior, more or less adnate to foveole of receptacle; ovule descending campylotropous; style terminal, 2-lobed at stigmatose apex. Fruit "baccate," finally sub-siccate, clothed with receptacle covered with peltate scales; testa of descending seed thin; cotyledons of exalbiminous embryo thick unequal; radicle superior incumbent.—Lactifluent trees or shrubs; leaves distichous petiolate, generally entire; stipules axillary, 2-nate, semiamplexicaul, deciduous; inflorescences axillary, oftener 2-nate or in racemes sometimes very compound. (*Trop. central and south. America.*[4])

52. **Ficus** T.[5]—Flowers 1-sexual, enclosed in utriculose oftener

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[1] Bracts interior to stamens, sometimes represent epigynous female calyx.

[2] Spec. known 3, of which 2 are Madagascarene.

[3] *Guian.* ii. 888, t. 340 (1775).—? *Ferolia* Abul. *Guian.* Suppl. 8, t. 372.—Lamk. *Dict.* ii. 452.—DC. *Prodr.* xvii. 293.—*Alicastrum* P. Br. *Jam.* (1756), 372. (Aublet's names have priority, but generically are not to be adhered to).—*Brosimum* Sw. *Fl. Ind. Occ.* i. (1799), 17, t. 1, fig. 1 (on no ground to be preferred to Aublet's name).—Spach, *Suit. à Buffon*, xi. 62.—Endl. *Gen.* n. 1861.—Tréc. *Ann. Sc. Nat.* sér. 3, viii. 138, t. 6, fig. 163-181.—Bur. *Prodr.* xvii. 288. —*Galactodendron* H. B. K. *Nov. Gen. et Spec.* vii. 163

[4] Spec. 7, 8, Tuss. *Journ. de Bot.* i. 202, t. 8; *Fl. Méd. Ant.* t. 9 (*Brosimum*).—Spreng. *Syst.* i. 22; iv. 403 (*Brosimum*).—Kl. *Linnæa*, xx. 522 (*Brosimum*). —Hook. *Bot. Mag.* t. 3723, 3724 (*Galactodendron*).—Miq. *Mart. Fl. Bras. Utric.* 108, t. 32, 33.—Griseb. *Fl. Brit. W.-Ind.* 152 (*Brosimum*).

[5] *Inst.* 662, t. 420.—L. *Ficus.* Upsal (1786);

globose or pear-shaped receptacle, more or less open at apex and there bracteate, androgynous or female; males and females glomerate, intermixed on the same receptacle or oftener separate. Calyx 2-6-phyllous, often incrassate or fleshy. Stamens 1 (*Urostigma*[1]), 2 (*Pharmacosycea*[2]), or 4–6, oppositisepalous; filaments free or connate at base; anthers introrse, 2-rimose. Germen sessile or stipitate, oftener 1-locular;[3] style lateral, at apex simple, subulate, obtuse, capitate, infundibuliform or 2-fid stigmatose, enclosed within receptacle; ovule descending, anatropous or campylotropous; micropyle extrorsely superior. Fruit drupaceous enclosed in receptacle not fissus nor expanded; stipes with thicker fleshy angles; mesocarp at both surfaces thin membranous, generally at last evanescent; putamen crustaceous or fragile, 1-spermous. Seed descending; testa membranous; albumen fleshy; cotyledons of incurved embryo rather flat, sometimes unequal; radicle superior incumbent. —Trees, sometimes lofty, or shrubs, sometimes climbing, lactescent; leaves generally alternate, sometimes more rarely opposite, entire or lobate, persistent or deciduous; stipules large convolute enclosing terminal bud of branchlet, deciduous or more rarely persistent; inflorescences axillary, solitary or fasciculate, sometimes more rarely in a spike or terminal raceme; receptacle oftener bracteate at base; male glomerules superior in androgynous receptacle; flowers sessile or pedicillate, bracteate or ebracteate. (*All trop. and temp. regions.*[4])

Gen. n. 1168.—Adans. *Fam. des Pl.* ii. 377.——J. *Gen.* 400.—Gærtn. *Fruct.* ii. 66, t. 91.—Lamk. *Dict.* ii. 489; Suppl. ii. 648; *Ill.* t. 861.—Turp. *Dict. Sc. Nat.* Atl. t. 285.—Spach, *Suit. à Buffon*, xi. 54.—Endl. *Gen.* n. 1859.—Gaspakr. *Nov. Gen. quæ sup. nonnull.* Fici *spec.* ...(1844); *Ric. s. nat. d. Fico e d. Caprifico* (1845); *Nov. ric. s. alc. punt...doctr. d. Fico e de Caprifico.*—Tréc, *Ann. Sc. Nat.* sér. 3, viii. 137.—Payer, *Organog.* 285, t. 61; *Fam. Nat.* 170.—Bur. *Prodr.* xvii. 287 (incl.: *Bosscheria* de Vriese et Teysm. (Bur.).—*Carica* Miq. (a part of which is *Caprificus* Gasp. *Nov. Gen.* 6; *Ric.* 79, t. 1-3. *Didymophora* Miq. *Eriosycea* Miq. *Kissosycea* Miq. *Leiosycea* Miq. *Nematosycea* Miq. *Podosycea* Miq. *Trematosycea* Miq.).—*Covellia* Gasp. *Nov. Gen.* 10; *Ric.* 85, t. 8, fig. 36–42 (*Sycomorphe* Miq. *Ann. Sc. Nat.* sér. 3, 1, 35).—*Erosma* Both. *Cat.* 113.—*Erythrogyne* Vis. Gasp. *Ric.* 86.—*Plagiostigma* Zucc. *Abh. Ak. Münch.* iv. 64 (*Tenorea* Gasper.).—*Pogonotrophe* Miq. *Hook. Journ.* vii. 72.—*Sycomorus* Gasp. *Ric.* 78.—Miq. *Hook. Lond. Journ.* vii. 109.—*Synœcia* Miq. *Hook. Lond. Journ.* vii. 469.

[1] Gasp. *Nov. Gen.* 7; *Ric.* 81, t. 7.—Miq. *Hook. Journ.* vi. 225; *Mart. Fl. Bras. Urtic.* 90, t. 27-31.—*Cystogyne* Gasp. *Nov. Gen.* 9; *Ric.* 84, t. 8.—*Visiania* Gasp. *Nov. Gen.* 9 (not DC.).—*Macrophthalma* Gasp. *Ric.* 83t. 8.—Miq. *Hook. Journ.* vi. 225.—*Galoglychia* Gasp. *Nov. Gen.* 10; *Ric.* 84 (*Sycocarpa* Miq.).

[2] Miq. *Hook. Lond. Journ.* vii. 64; *Mart. Fl. Bras. Utric.* 83, t. 25, 26.

[3] Sometimes very rarely 2, 3-locular.

[4] Spec. about 600 (Bur.). Thunb. *Ficus Gen.* Upsal (1786).—K. *Enum. Fic. Hort. Berol.* (1846), *Ann. Sc. Nat.* sér. 3, vii. 231.—Miq. *Prodr. Mon. Fic. Hook. London Journ.* (1847, 1848); *Journ. Bot. Neerl.* i. 230; *Zoll. Verz.* ii. 90; *Plant. Jungh.* 46; *Fl. Ind.-Bat.* i. p. ii. 293; Suppl. i. 173, 424; *Ann. Mus. Lugd.-Bat.* iii. 261, 285, 297.—Thw. *Enum. Pl. Zeyl.* 266.—A. Rich. *R. S. Cuba*, xi. 220.—Griseb. *Fl. Brit. W.-Ind.* 150.—Seem. *Fl. Vit.* 247.—Benth. *Fl. Hongk.* 326; *Fl. Austral.* vi. 160.—Gren. et Godr. *Fl. de Fr.* iii. 103.—Walp. *Ann.* i. 706; iii. 417.

53. **Sparattosyce** Bur.[1]—Flowers diœcious (of *Ficus*) sepals of male calyx 3–6, auriculate at base, imbricate. Fruit stipate with persistent calyx drupaceous; flesh scanty; putamen osseous. Seed descending; cotyledons of exalbuminous embryo broad conduplicate-involute and corrugate. Stamens in male flower 3–6, opposite sepals; anthers short extrorse; cells subglobose extrorsely rimose. Sepals of female flower 6–10, imbricate. Germen sessile; ovule, etc., of *Ficus*; styles exserted in mouth at top of female receptacle.—Trees; leaves alternate entire; stipules amplexicaul closely covering the terminal bud, deciduous; inflorescences of *Ficus*; receptacles of both sexes finally laterally divided and expanded. (*New Caledonia.*[2])

54. **Sorocea** A. S. H.[3]—Flowers diœcious; male calyx 4-fid or 4-partite, imbricate. Stamens 4, opposite; filaments sometimes linear; anthers ovate, extrorsely 2-rimose. Calyx of female flower superior perigynous, tubular or conical; mouth narrow subentire. Germen inferior 1-ovulate; style short thick, 2-lobed at apex; lobes stigmatose short divaricate exserted. Fruit baccate with receptacle sometimes muricate, 1-spermous; cotyledons of exalbuminous embryo 2; one large conduplicate enfolding the other very small and superior short radicle.—Trees or shrubs; leaves distichous, subentire, serrate or spinoso-dentate; stipules axillary, 2-nate; flowers in axillary (spurious[4]) racemes, intermixed with peltate remotely scattered bracts; females inserted in hollowed apices of branches; mature fruit sustained by swollen ramule (lobe) of ramiform receptacle. (*Brazil.*[5])

55? **Pseudosorocea** H. Bn.[6] — Flowers diœcious (nearly of *Sorocea*); male calyx 4-partite; lobes concave, decussately imbricate. Stamens equal in number and opposite to sepals; filaments very short inserted around vacant centre of receptacle, connate at base and there oftener dilated sometimes broadly subpetaloid; anthers short, oftener subovate, adnate extrorse, longitudinally 2-rimose. Female calyx semisuperior urceolate; style branches 2, etc., of *Sorocea*.—Shrubs or trees (?); habit and leaves of *Sorocea*;[1] limb entire, widely or coarsely spinoso-dentate, penninerved venose; costa and primary nerves anastomose at margin and somewhat prominent beneath; but flowers of both sexes inserted singly at amentiform margins of elongated receptacle and there glomerate sessile; both faces naked sulciform. (*Trop. and subtrop. South America.*[2])

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[1] *Ann. Sc. Nat.* sér. 5, xi. 379, t. 6; *Prodr.* xvii. 282.

[2] Spec. 2 of which one is unpublished (Bur.)

[3] A. S. H. *Mém. Mus.* vii. 473 (1821).—Endl. *Gen.* n. 1864.—Tréc. *Ann. Sc. Nat.* sér. 3. viii. 145, t. 6, fig. 183–188.—Bur. *Prodr.* xvii. 288. —*Sarcodiscus* Mart. Herb. (Miq.)

[4] Receptacle unequally ramose or rathe subfasciate not regularly racemose.

[5] Spec. 3, 4, Gaudich. *Voy. Bonite, Bot.* t. 71–74.—H. Bn. *Adansonia*, i. 212, t. 6.—Wawra. *Pr. Maxim. Ergebn.* Bot. 130.—Mic. *Mart. Fl. Bras. Urtic.* 112. t. 34.—Walp. *Ann.* i. 667.

H. Bn. *Adansonia*, xi. 296.

56? **Sahagunia** Liebm.[3]—Flowers diœcious; males densely congregated on spikelike branched receptacle (naked along longitudinal furrow), destitute of perianth and consisting of very crowded stamens, intermixed with cuneate cucullate-capitate bracts; filaments subulate; anthers subbasifixed; cells sub-2-dymous subopposite, rimose. Female flower and fruit . . . ?—A moderate-sized tree; leaves alternate, shortly petiolate, oblong penninerved; stipules 2, convolute, deciduous; male inflorescences racemose or fasciculate on naked or more rarely foliate branchlet.[4] (*Mexico*,[5] *Brazil ?*)

57. **Pourouma** Aubl.[6]—Flowers diœcious; male calyx 4-merous; folioles free or more or less highly connate, sometimes almost to apex. Stamens 4, oppositisepalous; filaments free or connate at base, straight or slightly incurved; anthers short, introrsely rimose. Calyx of female flower gamophyllous, ovoidly or conically tubular, thickened at base to a more or less prominent cupule, entire at apex and perforated at very small mouth. Germen sessile free, 1-locular, conical and attenuate above to style with more or less stigmatose apex, sometimes very discoidly peltate, entire or unequally lobed, very papillose. Ovule in cell 1, sessile, inserted laterally to linear parietal hilum hemitropous; chalaza inferior, sub-contiguous to base of cell; micropyle free extrorsely superior. Fruit enclosed by fleshy calyx, ligneo-crustaceous, finally 2-valved. Seed sometimes laterally adnate to pericarp by linear hilum, ovoid; testa membranous; coty-

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[1] Of which perhaps better a section? A genus hitherto admitted as a mean between *Sorocea* and *Soaresia* (whose male amenta bear naked stamens and the female pedicellate flowers.)

[2] Spec. 4, 5, H. Bn. *loc. cit.* n. 141–144.

[3] *Vidensk. Selskskr. Kjob.* sér. 5. ii. (1851), 316.—Bur. *Prodr.* xvii. 288.

[4] Of this genus seems to be *Soaresia nitida* (Allem. *Hook. Journ.* (1853), 270; *Revista brazileira*, i. 210 (Oct. 1857), c. ic.), a Brazilian tree with flowers and fruit nearly of *Sorocea*; male flowers pedicillate as in *Sorocea*; male amenta; 2 opposite surfaces floriferous, *i.e.* bearing numerous stamens without perianth. In other respects all these genera allied to *Sorocea* should be carefully revised from better specimens than hitherto supplied (as demanded by Bureau in his monograph of the Order). Here perhaps (?) is also to be referred *Clarisia* R. et Pav. (see p. 218, note 2).

[5] Spec. 1 (*S. mexicana* Liebm.), v. 2. (?)

[6] *Guian.* ii. 891, t. 341.—J. *Gen.* 406.—Poir. *Dict.* v. 606.—Endl. *Gen.* n. 1864¹.—Tréc. *Ann. Sc. Nat.* sér. 3, viii. 100 t. 2, fig. 52-60.—Bur. *Prodr.* xvii. 284.

ledons of straight exalbuminous embryo thick; radicle short superior.—Lactifluous trees; branches marked with linear scars of fallen stipules; leaves alternate, entire, lobed or digitately divided, glabrous or clothed with various indumentum, costulately venose and venulate; stipules connate in one clothing the top of the ramule; scars linearly annular; flowers collected in compound or decompound cymes on peduncle oftener 2-nate; males small. (*Trop. South America.*[1])

58. **Conocephalus** Bl.[2]—Flowers diœcious; male calyx tubular or turbinate, 4-dentate or 4-fid or more rarely unequally or subequally 2-partite, valvate or at apex slightly imbricate. Stamens 4, or very rarely 2, oppositisepalous; filaments erect in bud, subequal to calyx, complanate, centrally inserted around rudiment of gynæcium; anthers short exserted; cells oftener free at base, introrsely, laterally or extrorsely promiscuously rimose. Female calyx tubular, 4-fid. Germen free; style terminal, apex capitate, or laterally oblong stigmatose; ovule basilar erect orthotropous or suborthotropous; micropyle superior. Fruit enclosed by persistent calyx, dry chartaceous, longitudinally 2-valved. Seed ovoid; hilum basilar or sublateral; testa membranous; cotyledons of straight exalbuminous embryo fleshy plano-convex; radicle superior.—Climbing shrubs; leaves alternate, entire, long-petiolate; stipules axillary connate in one semiamplexicaul, deciduous; scars annular; flowers axillary capitate; capitule (glomeruliferous) compound cymose; females oftener solitary. (*Trop. south. Asia and Oceania.*[3])

59. **Coussapoa** Aubl.[4]—Flowers diœcious (nearly of *Conocephalus*); male calyx gamophyllous, subcylindrical or turbinate, imbricate; mouth 2–3-fid or dentate, sometimes partite. Stamens 2, central; filaments free or connate in erect filiform or complanate column; anthers free, extrorse, 2-rimose or connate in one 4-locular and terminal; cells longitudinally rimose. Female flower, etc., of

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[1] Spec. about 20. Pœpp. et Endl. *Nov. Gen. et Spec.* ii. 29, t. 141.—Kl. *Linnæa*, xx. 526.—Miq. *Mart. Fl. Bras. Urtic.* 121, t. 36–41.—Walp. *Ann.* i. 656.

[2] *Bijdr.* 483.—Endl. *Gen.* n. 1869.—Tréc. *Ann. Sec. Nat.* sér. 3, viii. 87, t. 2, fig. 41–51.—Bur. *Prodr.* xvii. 284.

[3] Spec. 7, 8 (about 10, Bur.). Benn. *Horsf. Pl. Jav. Rar.* 47, t. 12.—Lindl. *Bot. Reg.* t. 1203.—Gaudich. *Voy. Bonite Bot.* t. 96.—Miq. *Pl. Jungh.* 43; *Fl. Ind.-Bat.* i. p. ii. 283; Suppl. i. 171, 416, 417.—Teysm. et Binn. in *Nat. Tijdschr.* xxvii. 26.—Walp. *Ann.* i. 654.

[4] *Guian.* ii. 955, t. 362, 363.—J. *Gen.* 406.—Lamk. *Dict.* ii. 160.—Benn. *Horsf. Pl. Jav. Rar.* 49.—Endl. *Gen.* n. 1866.—Tréc. *Ann. Sc. Nat.* sér. 3, viii. 92, t. 1, fig. 23–40.—Bur. *Prodr.* xvii. 284.

Conocephalus; perianth tubular, cylindrical, ovoid or urceolate, sometimes obovoid, membranous or rather thick fleshy, apex either entire and sometimes perforated with a very small aperture, or more rarely 1–3-dentate. Germen free; ovule either quite basilar or orthotropous, or somewhat laterally inserted; micropyle always apical. Fruit drupaceous, enclosed by persistent and enlarged calyx, closely packed or adnate at base. Seed erect or ascending; hilum basilar or somewhat lateral; cotyledons of straight exalbuminous embryo plano-convex subequal; radicle superior short.—Trees or shrubs, sometimes climbing, lactescent; leaves alternate simple (of *Pourouma*), ovate or cordate or obovate, glabrous or pubescent, petiolate; stipules axillary connate in one obliquely amplexicaul, caducous; inflorescences axillary capitate; capitules glomeruliferous; peduncles oftener 2-nate, simple or 2-chotomous; branches capituliferous. (*Trop. South America.*[1])

60. **Cecropia** Lœfl.[2]—Flowers diœcious (nearly of *Coussapoa* or *Conocephalus*); males 2-androus; calyx tubular or narrow conical, at apex subentire or shortly 2-dentate, sometimes more deeply 2-fid. Stamens short; filaments erect; anthers introrse, 2-rimose. Female calyx tubular entire or subentire, subincrassate at apex and there perforated. Germen free, enclosed by calyx; ovule inserted under apex of cell descending, micropyle extrorsely superior; style terminal or slightly lateral short, apex stigmatose simple variously capitate-penicillate. Fruit dry, enclosed by calyx, hence subdrupaceous; seeds, etc., of *Coussapoa.*—Trees or shrubs; juice milky; branches terete, fistulous between the nodes; medulla hollow, here and there septate; leaves alternate, more or less peltate, palmatilobed or digitate; petiole often callose at base; stipules connate in one wide spathelike amplexicaul, deciduous; scars annular; flowers axillary crowded; peduncles 1, 2-nate, at apex subumbellately 2-∞ -rimose; umbels (spurious) single, the younger enclosed by spathiform caducous bract; branches (receptacles) amentiform subcylindrical glomeruliferous; males generally more slender than the females. (*Both trop. Americas.*[3])

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[1] Spec. about 20. Pœpp. et Endl. *Nov. Gen. et Spec.*, ii. 33, t. 147.—Kl. *Linnæa*, xx. 527.—Miq. *Mart. Fl. Bras. Urtic.* 131, t. 42–45.—Walp. *Ann.* i. 655.

[2] *It.* 272.—L. *Syst.* n. 1099.—J. *Gen.* 402.—Lamk. *Dict.* ii. 143; Suppl. ii. 374; *Ill.* t. 800.—Spach, *Suit. à Buffon*, xi. 108.—Endl. *Gen.* n. 1865.—Tréc. *Ann. Sc. Nat.* sér. 3, viii. 78, t. 1, fig. 9–22.—Bur. *Prodr.* xvii. 283.—F. Darwin, on the glandular bodies of *Cecropia peltata* (*J. Lin. Soc.* xv. 398).

[3] Spec. 30–40. Sloane, *Hist.* i. 138, t. 88

61. **Musanga** R. Br.[1]—Flowers diœcious; calyx tubular longer or shorter obconical, entire at apex and there truncate in males; mouth orbicular, in females perforated by very small aperture. Stamen 1, inserted at bottom of calyx; filament erect; anther terminal, facing outward; cells 2, longitudinally rimose. Germen erect enclosed free, 1-locular; ovule 1, basilar erect orthotropous; micropyle superior, at apex stigmatose scarcely incrassate. Fruit covered with persistent calyx rather ovoidly compressed subligneous; seed erect; embryo . . . ?—A tree;[2] leaves digitate; stipules wide foliaceous coriaceous, covering top of younger ramule, deciduous; male flowers in very compound capituliferous racemes; capitules globular small, intermixed with bracts peltate at apex; females glomerulate on thick oblong receptacle. (*Trop. west. Africa.*[3])

62. **Myrianthus** P.-Beauv.[4] — Flowers diœcious; males 4-merous, 4-androus (of *Conocephalus*); filaments sometimes variously connate; anthers 2-locular, 2-rimose. Female flowers of *Musanga* or *Conocephalus*; germen free 1-locular; ovule basilar erect orthotropous;[5] style clavate to stigmatose apex. Syncarp ovoid or ellipsoid wide and covering ∞ (dry ?) fruits; seed exalbuminous. Other characters of *Conocephalus.*—A moderate-sized tree; leaves alternate petiolate digitate; leaflets (to 6) lanceolate unequal, white beneath; stipules wide (of *Cecropia*); scar obliquely linear; glomerules of flowers ∞; males congregated along axes of ramose inflorescence; females on subglobose capitule.[6] (*Trop. west. Africa.*[7])

63. **Dicranostachys** Tréc.[8]—Flowers diœcious (nearly of *Myri-*

(*Yaruma*).—Plukn, *Almag.* 146, t. 242, fig. 5 (*Ficus*).—P. Br. *Jam.* 111 (*Coilotapalus*).—Jacq. *Obs.* ii. 12, t. 46; *Stirp. Am. Pict.* 126, t. 262, fig. 66.—Aubl. *Guian.* ii. 894.—W. *Spec.* iv. 651.—Spreng. *Syst.* iii. 809.—Kl. *Linnæa*, xx. 530.—Garcke, *Linnæa*, xxii. 70.—A. Rich. *R. S. Cuba*, xi. 222.—Griseb. *Fl. Brit. W.-Ind.* 152. — Liebm. *Vidensk. Selsk. Skrift. Kjoben.* (1851), 317. — Allem. *Revist. Brazil.* (Jan. 1860), 8, c. ic. — Miq. *Mart. Fl. Bras. Urtic.*. 139, t. 46–50.—Walp. *Ann.* i. 650.

[1] *App. to Tuck Nar.* (1818), 453 (*Congo*, 34); *Misc. Works* (ed. Benn.), i. 138, 153.—Benn. *Horsf. Pl. Jav. Rar.* 48.—Tréc. *Ann. Sc. Nat.* sér. 3, viii. 146.

[2] Habit and leaves of *Cecropia.*

[3] Spec. 1. *M. Smithii* R. Br. Herb.—Walp. *Ann.* i. 667.

[4] *Fl. Owar. et Ben.* i. 16, t. 11, 12.—R. Br. *Congo*, 449.—Endl. *Gen.* n. 1867.—Tréc. *Ann. Sc. Nat.* sér. 3, viii. 86.—Bur. *Prodr.* xvii. 284 (not Nutt.).

[5] Coat 2-plicate.

[6] In the axil of single leaves flowers are observed with superior conical foliaceous bud and 2 female inferior stipitate inflorescences, girt on both sides with scars of stipules. All the female flowers are not always on the surface of the receptacle, but some glomerules penetrate within the cavity of the receptacle. Hence later the receptacle deeply covers some of the fruit; whence it seems, Pal.-Beauvais, in his incorrect figure, took pains to depict a single seed-bearing berry within; the flesh of the receptacle being very similarly considered as the pericarp of the simple fruit.

[7] Spec. 1. *M. arboreus* P.-Beauv. *loc. cit.*—Benn. *Horsf. Pl. Jav. Rar.* 50.

[8] *Ann. Sc. Nat.* sér. 3, viii. 85, t. 1, fig. 1–8. —Bur. *Prodr.* xvii. 283.

anthus); male calyx 3–4-fid, imbricate. Stamens 3, 4; filaments short erect, connate at base; anthers extrorse, 2-rimose. Female calyx thickly urceolate, small aperture at apex. Germen, etc., of *Myrianthus* (or *Conocephalus*); style terminal exserted, clavate to apex, here laterally sulcate and stigmatose. Fruit (small ?) capitate; seed . . . ?—Trees; leaves alternate, simple or digitate (of *Myrianthus*); leaflets oftener serrate, whitish beneath, at base generally more or less unequilateral; male inflorescences ramose (of *Myrianthus*); female flowers congregated in spurious capitules; capitules few-flowered, contiguous only at base and stellately divaricate above.[1] (*Trop. west. Africa.*[2])

IV. CANNABINEÆ.

64. **Cannabis** T.—Flowers diœcious; male sepals 5, imbricate. Stamens 5, opposite sepals, pendent; filaments thin inserted round centre; anthers oblong subintrorse, finally marginate or extrorsely rimose. Female calyx gamophyllous membranous cupular enfolding the germen and persistent. Germen free, 1-locular; ovule 1, descending campylotropous; branches of terminal style 2, linear-elongate, sometimes equal, everywhere papilloso-stigmatose. Fruit dry,

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[1] A genus differing from *Myrianthus* only in the nature of its female inflorescence, in other respects closely allied.

[2] Spec. 1, 2 (3, ex Bur.). Walp. *Ann.* i. 653. Of the types imperfectly known, and, doubtfully, to be referred to this series (or to the preceding ?), a few words may be permitted respecting the 2 following:—

1. *Stenochasma* (Miq. *Fl. Ind.-Bat.* i. p. ii 292), enumerated among the *Artocarpeæ*, has diœcious flowers. Males. . . . ? Females said to be dense on axillary 2-nate pedunculate globose receptacle, subpedicillate. Perigonium utriculose, perforated at incrassate fleshy axile apex, membranous at base. Germen 1-ovulate; ovule inserted above the middle (whence agreeing neither with the *Urticeæ* nor with the *Conocephaleæ*). Style enclosed very short; stigma semiglobose depressed puberulous, subexserted. Achene (dark coloured) somewhat ovoidly compressed, enclosed in subbaccate 4, 5-angled obpyramidal perigonium; seed inserted near apex; cotyledons of (immature) embryo equal elliptical plano-convex; radicle very short. (Miq.).

2. *Clarisia* (R. et Pav. *Prodr.* 128, t. 28), a very doubtful genus, sometimes made a subgenus of *Myrica* (Endl. *Gen.* n. 1839 a), sometimes enumerated as an independent genus among the *Myricaceæ* (Lindl. *Veg. Kingd.* 256; —C. DC. *Prodr.* xvi. sect. ii. 155), from a somewhat rude figure of the male inflorescence, it seems rather to belong to this order and perhaps to the series *Artocarpeæ*; staminal filaments very similar not incurved in bud. From description, male amentum filiform, marked with a spiral furrow, covered with oblong imbricate scales, 1-florous. Perianth 0, unless the scales may be called such. Corolla 0. Staminal filaments 2, each inserted within a scale short erect filiform. Anthers small sub-4-angular. Female flowers in racemes 2-nate. Perianth proper (?) inferior very small squamose; scales 4–6, orbicular-subpeltate, affixed to pedicel by a disk, crenate at margin. Corolla 0. Germen ovate. Styles 2, subulate and patent; stigmas acute simple. Drupe ovate; seed subrotund. Species 2 arborescent (char. ex R. and Pav.—Affinity perhaps (?) with *Pseudosorocca*, *Sahagunia*. and *Soaresia*.).

clothed with calyx, indehiscent, 1-spermous; seed descending; cotyledons of exalbuminous curved embryo rather thick, dorsally convex; radicle subequal incumbent ascending.—An erect (strong smelling) scabrous pilose annual herb; juice aqueous; leaves opposite and alternate palmatinerved, 5–9-sect.; stipules free, persistent; flowers terminal and axillary to upper leaves; male inflorescence compound racemose loosely cymiferous; bracts linear; the uppermost often 0; female flowers condensed in compound cymes; bracts in cymule foliaceous, stipuliferous, 2-flowered; bracteoles of single flowers ovately lanceolate, with velvety glands externally (consisting of connate stipules, persistent around and finally longer than enclosed fruit). (*Temp. Asia.*) See p. 162.

65. **Humulus** L.—Flowers diœcious (nearly of *Cannabis*); stamens 5; filaments short; anthers erect. Female calyx gamophyllous persistent. Germen, etc., of *Cannabis*; style branches elongately subulate papilliferous equal. Fruit dry induviate; embryo of descending exalbuminous seed circinately involute.—Perennial (odorous) herbs; branches herbaceous volubile scabrous; leaves opposite petiolate, entire or oftener lobate; stipules interpetiolate wide, free or connate in pairs; male inflorescences loose with lanceolate bracts; female condensed with cone-like bracts and large distinct stipules, 2-flowered; bracteoles closely surrounding single flowers, more or less produced above, ovate or lanceolate; nearly all parts of the inflorescence and flowers more or less sprinkled with yellow resinous glandules. (*Temp. Europe and Asia.*) See p. 165.

LI. CASTANEACEÆ.

I. BIRCH SERIES.

Betula pumila.

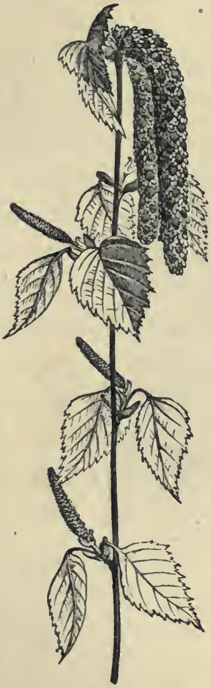

Fig. 146. Foliaceous and floriferous branch.

It is not with the *Chestnuts*, from which it received its name more than a century since, that we shall commence the study of this family, inasmuch as they represent a type with inferior ovary and complicated by the presence of an involucre quite peculiar, but with the *Birches*[1] (fig. 146–157), of which the gynæcium is superior and the flowers regular apetalous and monœcious. The males are often tetramerous, and the calyx may then, as in *B. pumila*[2] (fig. 146–150), be formed of four sepals. They are rarely equal in that case; much more frequently the anterior is more developed than the three others, which are themselves unequal. These latter may even disappear in great part or completely, as in neighbouring species. The andrœcium is represented by four elongate extrorse cells dehiscing by a longitudinal cleft.[3] According to certain authors, there are as many unilocular anthers; according to others (and this opinion ought probably to be adopted) there are only two anthers primarily superposed to two of the sepals, the anterior and posterior, the cells of which are quite separate, because each of these cells is supported by one of the two branches of a filament which, simple at its base, bifurcates at a variable height like the letter Y[1]. The female flowers are destitute of perianth and composed only of a free gynæcium with a bilocular ovary,[2] and surmounted by a style almost immediately divided into two long subulate branches, covered with stigmatic papillæ. In each of the ovarian cells (which are, like the styles, anterior and posterior), there is, in the internal angle, a placenta supporting a single[3] descending anatropous ovule, with the micropyle directed upwards and outwards.[4] The fruit, flat and edged with two membranous wings perceptible on the ovary and rendering it samaroid, is dry[5] and indehiscent, interlocular and monospermous by abortion of one of its seeds,[6] whilst the other is fertile and encloses under its coats a fleshy embryo, straight and destitute of albumen, with superior radicle and cotyledons fleshy and nearly flat.—The *Birches* are trees and shrubs growing in the cold and temperate regions of both worlds.[7] They

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[1] *Betula* T. *Inst.* 588, t. 360.—L. *Gen.* n. 1070.—J. *Gen.* 409.—Gærtn. *Fruct.* ii. 54, t. 90, fig. 2.—Lamk. *Dict.* i. 452; Suppl. i. 686; *Ill.* t. 760.—Turp. *Dict. Sc. Nat.* Atl. t. 301.—Spach, *Revis. Betulac. Ann. Sc. Nat.* sér. 2, xv. 182; *Suit. à Buffon*, xi. 145.—Nees, *Gen.* fasc. 4, t. 18.—Endl. *Gen.* n. 1840; Suppl. iv. p. ii. 19.—Payer, *Bull. Soc. Bot. de Fr.* v. 151; *Fam. Nat.* 161.—Regel, *Monogr. Betul.* 9; *DC. Prodr.* xvi. sect. ii. 161.—H. Bn. *Recherches Organogéniques sur les Amentacées* (*Compt. Rend. Assoc. Franç.* (1875), 756, t. 11, 12; *Adans.* xii. 1).

[2] L. *Mantiss.* 124.—Reg. *Prodr.* 173.

[3] The pollen is flat, ellipsoid, somewhat triangular, with three small pores and large halos. (H. Mohl, *Ann. Sc. Nat.* sér. 2, iii. 312).

Betula pumila.

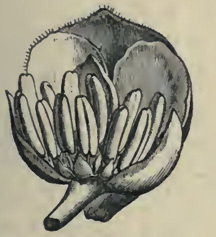

Fig. 147. Triflorous male scale ($\frac{8}{1}$).

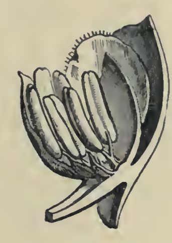

Fig. 148. Long. sect. of triflorous male scale.

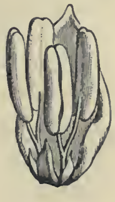

Fig. 149. Male flower.

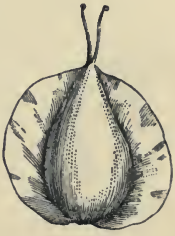

Fig. 150. Fruit ($\frac{5}{1}$).

Betula alba.

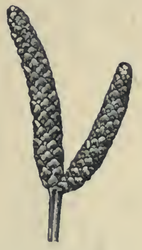

Fig. 152. Male catkins.

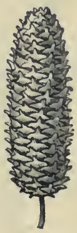

Fig. 155. Female catkin.

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[1] Admitting four stamens they have, in consequence, been described as diadelphous.

[2] In reality unilocular and possessing primarily two parietal placentæ which unite near the centre of the cavity, one of them generally becoming more or less completely abortive.

[3] Very rarely two ovules correspond to one cell, only one of which is perfectly developed.

[4] It has a simple coat.

[5] At the centre, the ovary is traversed by a vertical fascicle, itself surrounded by a disunited cellular tissue, forming part of the partition, very thick below, of the pericarp.

[6] Frequently there are two, but in that case one or the other is often sterile.

[7] As are the *Betulæ* in general, except one species of *Alnus* which inhabits southern Africa. (Reg.) Those which, in much smaller number, are observed in tropical Asia and America, grow on high mountains.

have alternate simple leaves, dentate or entire, not persistent, with petioles accompanied at the base by two lateral caducous stipules. Young, they are plicate and equitant in the interior of a scaly bud. The flowers are generally monœcious and collected in unisexual catkins, which are solitary, or more rarely in clusters,[1] to the number of two or four as in the Asiatic species constituting the genus *Betulaster*.[2] In the axil of each scale of the male catkin, there is a cyme, formed generally of three flowers, a median and two lateral, rising from the axillant scale and accompanied by two secondary scales, similarly supported and interior, one on each side.[3] In the female catkins, there is in the axil of each scale, accompanied also by four secondary scales, a biparous cyme three- or more-flowered, often reduced to two flowers.[4] In the fructiferous catkin, the principal accrescent scales accompanied by the secondary scales embodied with them,[5] are detached early or persist for a longer or shorter period on the axis of the catkin, with the samaræ, which they completely conceal in all the *Birches*

Betula alba.

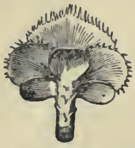

Fig. 154. Male floriferous scale without flowers.

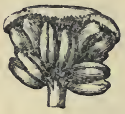

Fig. 153. Male flowers.

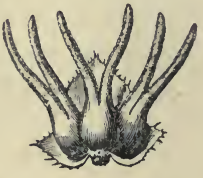

Fig. 156. Triflorous female cyme.

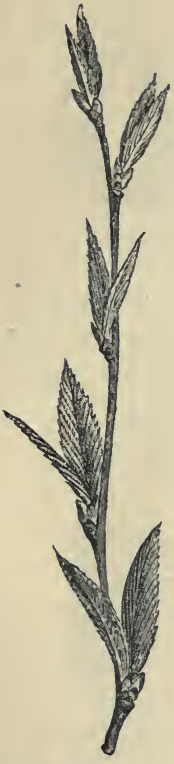

Fig. 151. Young foliaceous branch.

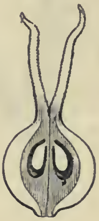

Fig. 157. Long. sect. of female flower $\frac{4}{1}$.

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[1] Often, as in *B. fruticosa*, the axis of a female catkin thickens and its lower portion persists and ultimately developes into a branch which, the following year, bears leaves and flowers, the female catkins of which will likewise have a persistent base.

[2] Spach, *Ann. Sc. Nat.* sér. 2, xv. 182, 198.—Endl. *Gen.* Suppl. iv. p. ii. 20.

[3] They have often been considered as stipules of the principal bract or scale. Previous to their late displacement they appear, from the situation, to represent two lateral bracteoles, the axil of which would be occupied by the lateral flowers of the inflorescence.

[4] From abortion of the terminal flower, not unfrequent in this genus.

[5] So that the whole then appears a rigid bract, trilobed above.

proper,[1] whilst they are shorter than the fruit in *Betulaster*.[2] Some thirty species are admitted in the genus[3] thus limited.

Alnus cordifolia.

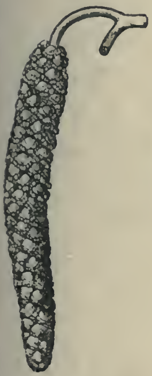

Fig. 159. Male catkin.

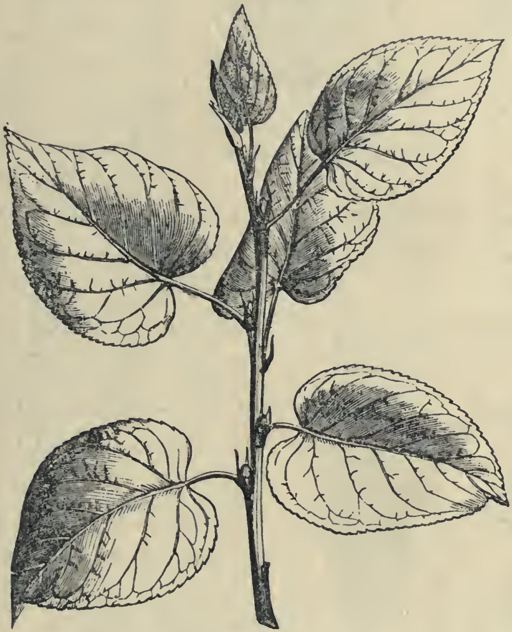

Fig. 158. Foliaceous branch

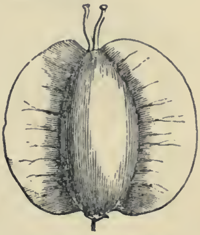

Fig. 163. Fruit ($\frac{5}{1}$).

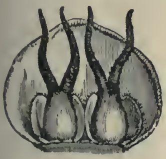

Fig. 162. Biflorous female floriferous scale.

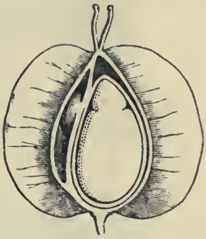

Fig. 164. Long. sect. of fruit.

The *Alders*[4] (Fig. 158–167) differ but little from the *Birches* with which they were formerly united. The flowers are also monœcious and disposed in catkins. In the axil of the scales of the male catkin, there are generally three flowers forming a cyme, or, more rarely, a single flower; and the secondary scales, rising with the flowers from the principal scale, are generally four in number, two on each side. The perianth, sometimes but little developed, is formed of four folioles, free or united at the base, and the stamens, equal in number, are superposed to them. Rarely the flower is 10–12-merous and 10–12-androus.[1] In the female catkin, ordinarily shorter, more rigid than in the *Birches*, and erect, there are only two flowers in the axil of each of the thick scales, the middle one being abortive. The gynæcium is similar to that of the *Birches*, and the fruit, dry and monospermous, is wingless or surrounded by a membranous wing. The axillant scales there become woody. The *Alders* are trees and shrubs of the temperate and cold regions of both worlds in the northern hemisphere, rare in South America and southern Africa. Their organs of vegetation are analogous to those of the *Birches*. The leaves are accompanied by lateral stipules. The flowers are sometimes developed at the same time as the leaves, but more frequently earlier, and in this case the females may, as in the species constituting the genus *Alnaster*,[2] emerge from buds bearing one or more leaves. Often the catkins are solitary, more rarely they are collected in clusters. About fifteen species of *Alder* are enumerated.[4]

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[1] Sect. *Eubetula* REG. *Prodr.* 162, sect. 1.

[2] REG. *Prodr.* 179 (sect. 2).

[3] L. Spec. ed. 2, ii. 1193; *Mantiss.* 124.—W. *Spec.* iv. 462. — PALL. *Fl. Ross.* i. 60, t. 39, 40.—LEDEB. *Fl. Ross.* iii. 649.—MICHX. *Fl. Bor.-Amer.* ii. 180.—KOCH, *Syn. Fl. Germ.* ed. 2, 760.—TRAUTV. et MEY. *Middend. Reis. Fl. Och.* 81.—SCHRANK, *Fl. Baical.* i. 421.—FR. *Summ. Veg. Scand.* i. 212.—BGE. *Fl. Alt. Suppl. Mém. Acad. Pétersb.* (1835), 506.—CHAM. *Linnæa*, v. 537, t. 6.—WALL. *Pl. As. Rar.* ii. 7, t. 109.—DON, *Prodr. Fl. Nep.* 58.—SPACH, *Jacquem. Voy. Bot.* t. 158.—SIEB. et ZUCC. *Abh. d. Kœn. Baier. Ak.* iv. Abth. 3, 228.—MIQ. *Ann. Mus. Lugd.-Bat.* ii. 136.—GREN. et GODR. *Fl. de Fr.* iii. 146.

[4] *Alnus* T. *Inst.* 587, t. 359.—LAMK. *Dict.* i. 330.—NEES, *Gen.* iv. t. 19.—ENDL. *Gen.* n. 1841; Suppl. iv. p. ii. 20.—SPACH, *Ann. Sc. Nat.* sér. 2, xv. 124, 203; *Suit. à Buffon*, xi. 246.—REG. *Monogr. Betul.* 73; *DC. Prodr.* xvi. sect. ii. 180.

Alnus cordifolia.

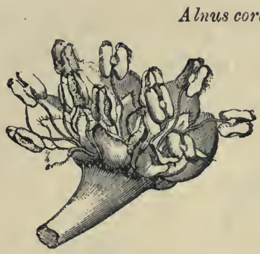

Fig. 160. Triflorous male floriferous scale.

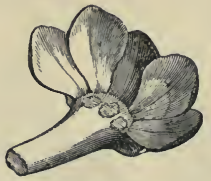

Fig. 161. Male floriferous scale, flowers removed.

Alnus glutinosa.

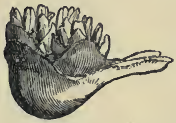

Fig. 165. Side view of male floriferous scale.

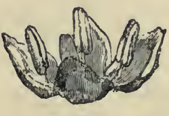

Fig. 166. Male flower.

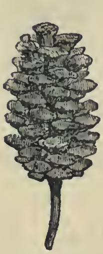

Fig. 167. Compound fruit.

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[1] In *A. nitida* Endl. and *nepalensis* Don, of which has been made the genus *Clethropsis* (Spach, *Ann. Sc. Nat.* sér. 2, xv. 183, 201).

[2] Spach, *Ann. Sc. Nat.* sér. 2, xv. 200 ; *Suit. à Buffon*, xi. 244.

[3] On these grounds Regel divides the genus into 4 sections: 1. *Clethropsis* (Spach). Flowers developed at same time as leaves. Male scales uniflorous. Female flower 10–12-merous.—2. *Alnaster* (Endl.). Flowers precocious. Male catkins coming from 1-3-phyllous buds. Scales 3-florous. Fruit with membranous wing.—3. *Phyllothyrsus* (Spach). Flowers developed at same time as leaves. Scales 3-florous. Floral buds aphyllous. Fruit with membranous wing.— 4. *Gymnothyrsus* (Spach). Flowers precocious. Scales 3-florous. Floral buds leafless. Fruit wingless or with coriaceous wing.

[4] L. *Spec.* 1314 (*Betula*).—Gærtn. *Fruct.* ii. 54, t. 90 (*Betula*).—Lamk. *Dict.* i. 454 (*Betula*).—Ait. *Hort. Kew.* iii. 139 (*Betula*).—Ehrh. *Beitr.* 72 (*Betula*).—Mirb. *Mém. Mus.* xiv. 464, t. 22.—W. *Spec.* iv. 334.—H. B. K. *Nov. Gen. et Spec.* ii. 16.—DC. *Fl. Franc.* iii. 304.—Don, *Prodr. Fl. Nepal.* 58.—Bong. *Mém. Pétersb.* sér 6, ii. 162.—Nutt. *Sylv. Amer.* Suppl. i. 34, t. 10.—Ten. *Fl. Nap. Prodr.* 54 ; *Icon.* ii. 340, t. 99.—Dcne. *Ann. Sc. Nat.* sér. 2, iv. 348.—Sieb. et Zucc. *Abh. Akad. Münch.* iv. Abth.

II. HAZEL SERIES.

In most of the *Hazels* or Nut-trees[1] (fig. 168–174), the flowers, amentaceous and monœcious, are apetalous and regular. The male catkins, similar to those of the *Birches*, bear numerous alternate scales, and within these are nearly always found two lateral scales supported with them.[2] Near the point of union of these various appendages stamens are inserted, most frequently to the number of eight,[3] formed each of a filament and a unilocular,[4] extrorse[5]

Corylus Avellana.

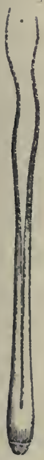

Fig. 171. Female flower.

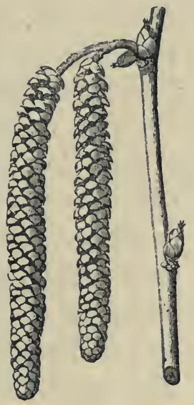

Fig. 168. Male and female inflorescences.

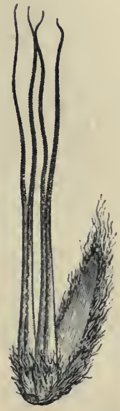

Fig. 169. Two-flowered female scale.

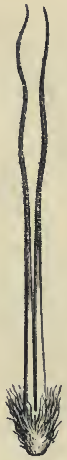

Fig. 170. Female flower surrounded by young involucre.

3, 230.—Tausch, *Flora* (1834), 520.— Pœpp. et Endl. *Nov. Gen. et Spec.* t. 198, fig. C.—Miq, *Ann. Mus. Lugd.-Bat.* ii. 137.—A. Gray, *Man.* ed. 5, 460.—Bertol. *Fl. Ital.* x. 163.—Ledeb. *Fl. Ross.* iii. 657.—Rupr. *Bull. Acad. Pétersb.* (1857), 558.—Gren. et Godr. *Fl. de Fr.* iii. 148.

[1] *Corylus* T. *Inst.* 581, t. 347.—L. *Gen.* n. 730.—Adans. *Fam. des. Pl.* ii. 375.—J. *Gen.* 410.—Lamk. *Dict.* iv. 495; Suppl. iv. 101; *Ill.* t. 780.—Gærtn. *Fruct.* ii. 52, t. 89.—Schkuhr, *Handb.* t. 305.—Turp. *Dict. Sc. Nat.* Atl. t. 302, 303.—Nees, *Gen.* ii. 22.—Spach, *Suit. à Buffon,* xi. 205.—Endl. *Gen.* n. 1844.—Schacht, *Lehrb.* 441, t. 9; *Der Baum,* t. 4.—Payer, *Fam. Nat.* 163.—A. DC. *Prodr.* xvi. sect. ii. 129.—H. Bn. *Compt. Rend. Acad. Sc.* lxxvii. 61; *Compt. Rend. Ass. Franç.* i. (1872), 496, t. 9; *Adansonia,* xi. t. 6.

[2] They are notably wanting in *Ostryopsis* They have been considered as lateral stipules of the principal bracts; with others they take the place of leaves (Dœll, *Rhein. Fl.* 273; *Zur Erkl. Laubkn. Ament.* 19, fig. 6).

[3] There are rarely more, often less, especially in the flowers near the top of the catkin. These may even be only 2-androus. Decaisne inadvertently describes *Ostryopsis* as 4-androus; they often have as many stamens as other species of *Corylus.*

[4] "Rather (theoretically) 4 stamens, the anthers and filaments being sometimes divided."

[5] They are extrorse, not with respect to the axis of the inflorescence (for relatively to that the lower and interior are introrse), but with respect to the centre of the flower.

anther, dehiscing by a longitudinal cleft.[1] The female flowers are disposed in a very short bud-like catkin (fig. 172), with alternate and imbricate bracts, few in number. In the axil of each of these are found the flowers, arranged in pairs and surrounded each by an involucre covered with hairs, formed by the lateral secondary bract, here more or less deeply cut and finally surrounding the floral receptacle. The latter has the form of a sac with narrow opening, enclosing in its cavity the adnate ovary surmounted by a small annular calyx, very short, epigynous and surrounding the base of a style soon divided into two large subulate stigmatiferous branches, coloured red.[2] In the inferior ovary,[3] there were originally two parietal placentæ uniting along the axis of the cavity to form two cells, each of which might bear two ovules; but ordinarily in the adult flower, each cell contains only one descending anatropous ovule,[4] with micropyle directed upwards and outwards.[5] The fruit, around which the secondary bract, forming the involucre, has taken the form of a long green sac, is an achene the pericarp of which, dry and indehiscent, unilocular and monospermous,[6] is formed partly of the hardened walls of the receptacular pouch; it is crowned with the scars of the style and calyx. The descending seed, surrounded by a soft disconnected[7] tissue, encloses under its coats a large fleshy

Corylus Avellana.

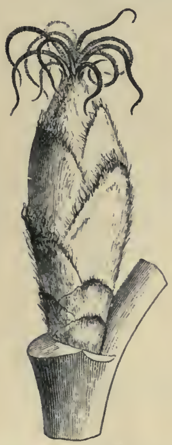

Fig. 172. Female inflorescence ($\frac{5}{1}$).

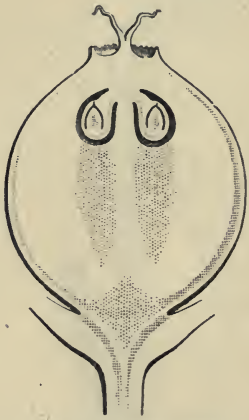

Fig. 173. Young fruit, long. sect. ($\frac{5}{1}$).

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[1] According to H. Mohl. the pollen is similar to that of the *Betuleæ*. Its spherical granules open by three pores (Hass. *Ann. and Mag. Nat. Hist.* ix. 556).

[2] It is the only portion of the female flower which exists at the period of floration.

[3] Not formed till much later, near the middle of spring.

[4] Strictly there may be four ovules, two on each placenta, two of which are sooner or later arrested in their development. The two ovules which remain may belong to the same placenta; but more frequently they are inserted on separate placentæ, and correspond each to a different cell. Very rarely the two persistent ovules are found inserted on different placentæ and yet correspond to one and the same cell.

[5] They have only one envelope.

[6] It is often dispermous; but one of the seeds is sometimes reduced to small dimensions.

[7] This tissue, originally white and firm, but which becomes thin and brown in the ripe fruit, traversed by a central vertical fascicle, is not developed in the cavity of the cell of which it occupies the upper part, it is a hypertrophiate layer of the pericarp itself, *i.e.* of the floral receptacle.

rectilineal embryo, with thick and oily plano-convex cotyledons and a short superior radicle. There are some *Hazels* in which the foliaceous involucre is much elongated in a tube beyond the fruit; they have been named *Tubo-Avellana*;[1] and others in which the edges of the large involucre is divided into ramified spinous teeth resembling the prickles of the Chestnuts; these form *Acanthochlamys*.[2] Others again, as *C. Davidiana* (fig. 174), a species from the north-east of Asia, have a small fruit, surrounded, besides the sacciform membranous involucre, by a rather large exterior bract, accrescent and cleft within; of these the genus *Ostryopsis*[3] has been formed. Thus constituted, the genus *Corylus*[4] comprises eight species,[5] natives of the temperate northern regions of both worlds. They are small trees or shrubs having alternate, penninerved,[6] dentate leaves, with a petiole accompanied at its base with two lateral caducous stipules. The male catkins are solitary, pendent, or disposed in clusters on the wood of the branches where they are developed in winter before the leaves. The female catkins, much shorter, appear somewhat later on the branches of the preceding year, but likewise before the leaves, and are at first nearly sessile. Their very short support is a branch which, during the maturation of the fruit, is lengthened and finally presents, under the achenes which terminate it, generally few in number often in pairs, several alternate leaves similar to those of the other branches.

Corylus Davidiana.

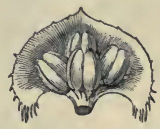

Fig. 174. Tetrandrous male floriferous scale ($\frac{5}{1}$).

Beside *Corylus* are placed the *Hornbeams*,[7] the flowers of which are nearly the same, equally monœcious, precocious, and amentaceous. The stamens number from three to twenty in the axil of the bracts of the male catkin (fig. 175) and are formed of a free slender filament, bifurcate as Y, and an extrorse anther and cell, surmounting each of the branches, longitudinally dehiscent.[1] In the female catkin long and slender (fig. 176), the alternate caducous bracts correspond to two flowers (fig. 177, 178) which occupy each the axil of a lateral bract. This, unlike that of the *Hazels*, persisting and growing beside the fruit, does not completely envelope it and remains foliaceous, rigid, trilobed[2] (fig. 179, 180). The ovary, surmounted by a small dentate calyx and a style similar to that of the Nuts, has the same organization and is finally divided into two cells by two placentæ at first parietal, each also bearing one or two

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[1] Spach, *Ann. Sc. Nat.* sér. 2, xvi. 106, sect. 2.—A. DC. *Prodr.* 133, § 2.

[2] Spach, *loc. cit.* 108.—A. DC. *Prodr.* 129.

[3] Dcne. *Bull. Soc. Bot. de Fr.* xx. 155.

[4] Corylus sect. 4.
- 1 *Avellana* (Bauh.—Spach).
- 2 *Tubo-Avellana* (Spach).
- 3 *Ostryopsis* (Dcne.).
- 4 *Acanthochlamys* (Spach).

[5] J. Bauh. *Hist.* i. 270 (*Avellana*).—Clus. *Hist.* 11 (*Avellana*).—L. *Hort. Cliff.* 448; *Spec.* 1417.—Ait. *Hort. Kew.* iii. 364.—Duham. *Arbr.* éd Nouv. iv. 20.—Walt. *Fl. Carol.* 236.—Michx. *Fl. Bor.-Amer.* ii. 201.—Trautv. *Ic. Ross.* i. 10, t. 4.—Fisch. *Flora* (1834), Beibl. 24.—Reichb. *Ic.* 636-638.—Wall. *Pl. Ass. Rar.* i. 77, t. 87.—Reg. *Veg. Amur.* 489.—Benth. *Pl. Hartweg.* n. 1960.—A. Gray, *Man.* ed. 5, 456.—Chapm. *Fl. S. Unit. St.* 425.—Hart. *Forst. Cult. Pfl. Deutschl.* 217, t. 15-17.—Dochmahl, *D. Obstkunde*, iv. 29.—Gren. et Godr. *Fl. de Fr.* iii. 119.

[6] In the bud they are folded longitudinally, following the principal nervure, and consequently look sidewise to the branch bearing them.

[7] *Carpinus* T. *Inst.* 582, t. 348.—L. *Gen.* n. 1073.—J. *Gen.* 409.—Gærtn. *Fruct.* ii. 52, t. 89.—Lamk. *Dict.* i. 707; Suppl. ii. 202; *Ill.* t. 780.—Schkuhr, *Handb.* t. 304.—Spach, *Suit. à Buffon*, xi, 219; *Ann. Sc. Nat.* sér. 2, xvi. 248.—Nees, *Gen.* ii. 20.—Endl. *Gen.* n. 1843.—Dœll, *Zur Erklaer. Laubkn. Ament.* 15, fig. 13, 14.—Schacht, *Lehrb.* ii. 440; *Der Baum*, t. 4, fig. 1-9. — Payer, *Fam. Nat.* 164. — A. DC. *Prodr.* xvi. sect. ii. 125.

Carpinus Betulus.

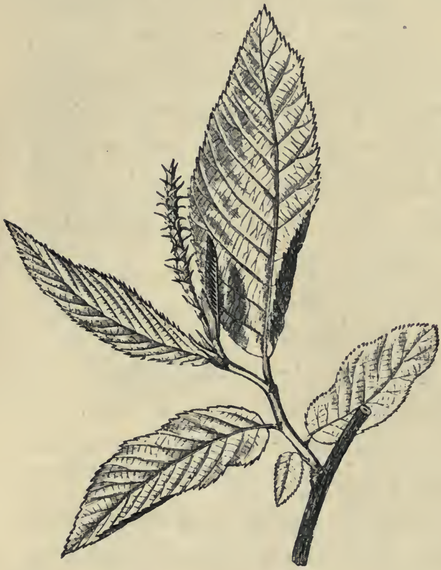

Fig. 176. Female flowering branch.

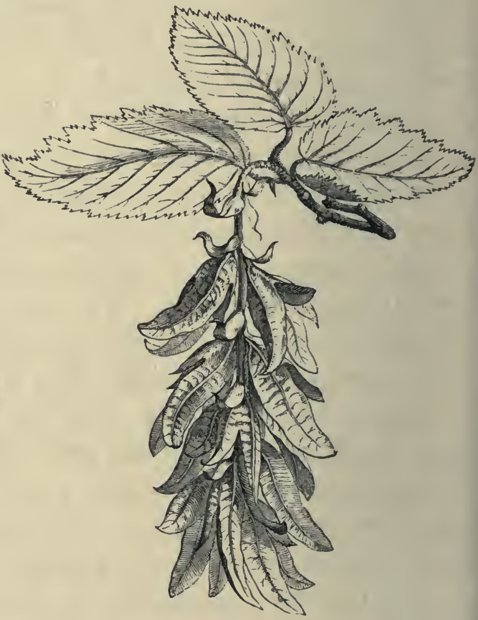

Fig. 179. Fructiferous branch.

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[1] The summit is ordinarily surmounted by a tuft of hairs. The pollen is similar to that of *Corylus*, (H. Mohl).

[2] The same is the case in *C. japonica* Bl. *cordata* Bl. *laxiflora* Bl. (*Mus. Lugd. Bat.* i. 308), of which has been made the genus *Distegocarpus* (Sieb. et Zucc. *Fl. Jap. Fam. Nat.* ii. 102. t. 3; —A. DC. *Prodr.* 127), and which appears to us ought to form only a section (with sublobate fruit) of the genus *Carpinus*. A kind of small roundish ligule is seen within the secondary bracts.

ovules similar to those of *Corylus*. The fruit is the same, though in general smaller and less hard, traversed by vertical salient nervures. In *Carpinus Ostrya*[1] and *virginiana*,[2] of which the genus *Ostrya*[3] has been formed, the lateral bract, foliaceous like that of the Hornbeams proper, surrounds the ovary, then the fruit, with a sort of membranous conical sac, closed, finally covered with very fine rigid hairs which easily penetrate the skin. In this respect, these species, all the other characters of which are those of the *Hornbeams*, and which, with us, will constitute only a section of this genus, serve as intermediaries between *Corylus* and other species of *Carpinus*. There are about ten species[4] of Hornbeams inhabiting the temperate regions of both worlds. They are trees or shrubs, with alternate, penninerved, doubly serrate leaves, folded in the bud according to the secondary nervures,[5] accompanied at the base with two lateral caducous stipules.[6] The male catkins are lateral; and the female terminal. At the period of fructification, these latter are elongate, pendent and racemiform (fig. 176).

Carpinus Betulus.

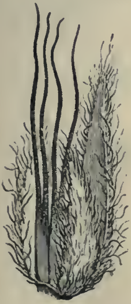

Fig. 177. Female floriferous scale.

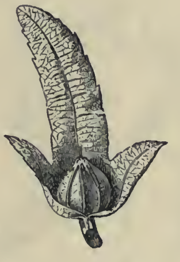

Fig. 180. Fruit.

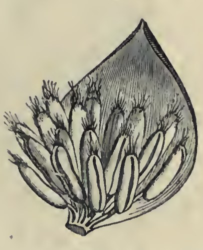

Fig. 175. Male floriferous scale ($\frac{6}{1}$).

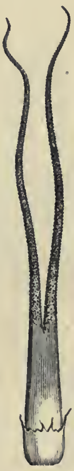

Fig. 178. Female flower ($\frac{12}{1}$).

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[1] L. *Spec.* 1417 (as regards European plants).

[2] LAMK. *Dict.* i. 700, n. 4.

[3] MICHELI, *Gen.* 223, t. 104.—NEES. *Gen.* i. t. 13.—SPACH, *Suit. à Buffon*, xi. 215; *Ann. Sc. Nat.* sér. 2, xvi. 243.—ENDL. *Gen.* n. 1842; Suppl. iv. p. ii. 22.—A. DC. *Prodr.* xvi. p. 2, 124.

[4] L. *Spec.* 1416.—LEDEB. *Fl. Ross.* iii. 586.—WALT. *Fl. Carol.* 236.—LINDL. *Wall. Pl. As. Rar.* ii. 4, t. 106.—REICHB. *Ic.* t. 633–635.—SCOP. *Fl. Carniol.* (ed. 1772), n. 1190, t. 60.—WATS. *Dendr.* t. 143 (*Ostrya*), 157.—MIQ. *Ann. Mus. Lugd.-Bat.* i. 121.—A. GRAY, *Man.* ed. 5, 457.—CHAPM. *Fl. S. Unit. St.* 425.—GREN. et GODR. *Fl. de Fr.* iii. 120.—WALP. *Ann.* iii. 379.

[5] With some authors (A. DC. *Prodr.* 124) a character of a tribe of *Carpineæ* of the family of *Corylaceæ*; on the prefoliation see ZUCC. *Char. Holzgew.* t. 2.—HENRY, *Act. Nat. Cur.* xxii. p. i. t. 29.

[6] On the supernumerary germination of *Carpinus Betulus*, see VIAUD-GRANDMARAIS, *Bull Soc. Bot. de Fr.* vii. 839.

III. OAK SERIES.

The flowers of the *Oaks*[1] (fig. 181–188) are monœcious and arranged in spikes. Those bearing male flowers (fig. 181, 183) have a slender axis, often pendent, and alternate bracts, in the axil of which are the flowers, solitary or collected in glomerules. They are often pentamerous; but the calyx may have a smaller number of divisions, generally united below, or a greater number,[2] and they are imbricate or valvate in prefloration. The andrœcium is often formed of stamens equal in number and superposed to the sepals; but an equal number, or less, of alternate stamens. Finally, the number of pieces of the andrœcium may descend to three or four or

Quercus Robur.

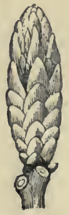

Fig. 182. Bud.

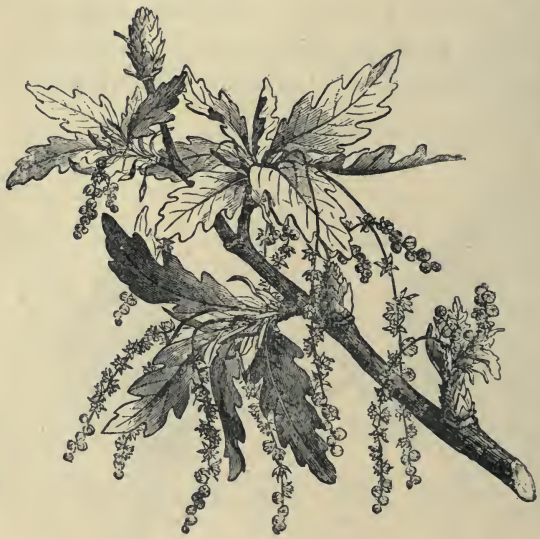

Fig. 181. Floriferous branch.

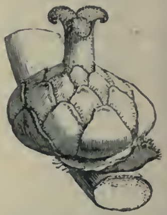

Fig. 185. Female flower ($\frac{5}{1}$).

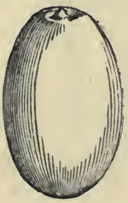

Fig. 188. Seed.

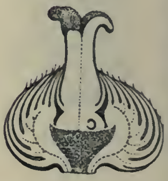

Fig. 186. Long. sect. of female flower.

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[1] *Quercus* T. *Inst.* 582, t. 349.—L. *Gen.* (ed. 1), 726.—J. *Gen.* 410, 452.—Gærtn. *Fruct.* i. t. 37.—Lamk. *Dict.* i. 715; Suppl. ii. 209; *Ill.* t. 779.—Schkuhr, *Handb.* t. 301, 302.—Nees, *Gen.* ii. 23.—Spach, *Suit. à Buffon*, xi. 145.—Endl. *Gen.* n. 1845; Suppl. iv. p. ii. 24.—Schacht, *Beitr.* i. 36, t. 3; *Der Baum*, t. 3.—Payer, *Fam. Nat.* 164.—A. DC. *Seem. Journ. Bot.* (1863), 182 *Ann. Sc. Nat.* sér. 4, xviii. 49; *Prodr.* xvi. sect. ii. 2.—*Ilex* T. *Inst.* 583, t. 350.—*Suber* T. *Inst.* 584.—*Synædris* Lindl. *Introd.* (ed. 2), 441.—*Lithocarpus* Bl. *Bijdr.* 526; *Fl. Jav.* fasc. 13, 34, t. 20.—Endl. *Gen.* n. 1846.

[2] To a dozen.

rise to fifteen. All are formed of a free slender filament, inserted in the centre of a floral receptacle, rarely under a rudimentary gynæcium, and of an exserted, bilocular, extrorse anther, dehiscing by two longitudinal clefts.[1] The female catkin (fig. 184) is ordinarily thicker, more rigid and bearing a smaller number of flowers.[2] They have a gourd-like receptacle, with a neck more or less elongate, and the cavity of which entirely shelters the inferior ovary (fig. 185, 186), whilst its superior opening bears a calyx often having six[3] divisions imbricate in two series, more rarely a lower or higher number.[4] The ovary is surmounted by a style with three branches of variable form,[5] often thickened, dilated and obtuse at their stigmatiferous extremity, entire or slightly lobed. It encloses three[6] cells, more or less incomplete, either above or below, containing each two collateral, descending ovules, more or less completely anatropous, with micropyle exterior and superior.[7] The ovary is, at its base, surrounded to a variable height by a cupule entirely covered externally with bractlike prominences of very variable dimensions (fig. 185, 186), not unfrequently nearly smooth or traversed by folds or wrinkles nearly horizontal or oblique.[8] This cupule persists thickening and hardening around the fruit (fig. 187) which it may even completely

Quercus Robur.

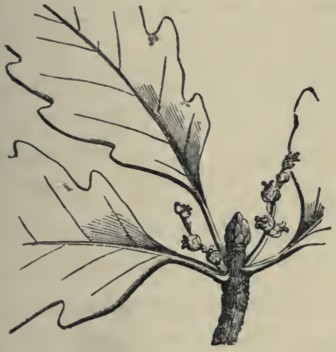

Fig. 184. Female inflorescence.

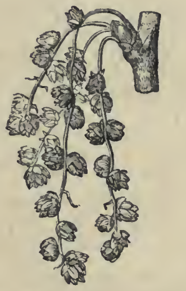

Fig. 183. Male inflorescence.

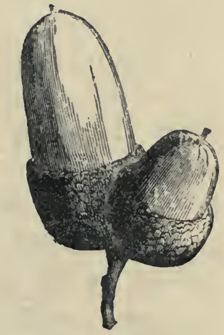

Fig. 187. Fruit.

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[1] The pollen is "round; threefold; in water three linear bands" (H. MOHL, *Ann. Sc. Nat.* sér. 2, iii. 312).

[2] Not unfrequently two or even a single one.

[3] From four to nine.

[4] Here and there are abnormal flowers with one or more sterile or fertile stamens, either within or without the perianth

[5] Rarely linear, erect (see p. 233).

[6] Sometimes two or four.

[7] With double coat.

[8] The morphological signification of this

envelope,[1] and which is an achene, the *acorn*, inserted by a large, scar-like surface at the bottom of its cupule,[2] from which finally it generally separates,[3] and surmounted by the remains of the superior calyx and styles. Ordinarily it encloses only a single fertile descending seed (fig. 188), accompanied, at a very variable point of its height,[4] by five other seeds, small and sterile, and containing under its coats a large fleshy embryo, destitute of albumen, with thick plano-convex cotyledons, sometimes smooth and sometimes more or less wrinkled or ruminated externally, and a short superior radicle, partly or entirely concealed by the prolonged base of the cotyledons.

There are *Oaks* in all parts of the northern hemisphere, both old and new world, and some inhabit tropical regions. They are trees, rarely of low elevation, with alternate leaves persistent or falling in winter, accompanied by two lateral caducous stipules. The limb[5] is penninerved, entire or more or less deeply cut, longitudinally plicate in prefloration, and at first enveloped in buds with imbricate scales, formed by the stipules[6] (fig. 182). The inflorescences, ordinarily unisexual, sometimes have female flowers at the base and males in their upper portion, which are early detached. The male catkins, pendent or erect, rise from the axil of the inferior leaves of the young branches or of the bracts which replace them at this level, oftener from lateral aphyllous or few-leaved buds. The female cat-

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cupule, formerly considered as formed of bracts united together to a variable height, has been much discussed. It is now pretty well agreed as to the axile nature of the body of the cupule itself, which SCHACHT calls a disk and PAYER a fold of the peduncle. We may, however, hesitate as to the nature of the prominences it bears and which often, by their form and anatomic structure, closely approximate to foliaceous organs, but which, by the same characters (the value of which is insignificant), and also by their tardy appearance on the body itself of the cupule, may appear equally comparable to prickles.

[1] There are species in which it divides superiorly at maturity.

[2] To which it sometimes adheres in its lower part.

[3] The fruit is matured sometimes in the year and sometimes, after a long repose, in the following year. (J. GAY, *Bull. Soc. Bot. de Fr.* (1857), 445, 501; *Ann. Sc. Nat.* sér. 4, vi. 223); a character noted by MICHAUX, in his *Histoire des Chênes*, in 1801, and which has served to distinguish certain species. The biennial maturing is, perhaps, owing to defect of fecundation in the first year.

[4] Sometimes near the base, as in *Q. Robur*, sometimes between the base and the middle, as in *Q. Suber*, more frequently near the summit. (A. DC. *Biblioth. Univ. Gen.* (Oct. 1862); *Ann. Sc. Nat.* sér. 4, xviii. 49.).

[5] When young, like many other parts, it is covered with stellate or fasciculate hairs, with some solitary, or ordinarily caducous, or contracted in adult age (A. DC.).

[6] DŒLL, *Zur Erklaer. d. Laubkn. Ament.* (1848); *Fl. Bad.* ii. (on the morphological character of the cupule).—HENRY, *Nov. Act. Nat. Cur.* xxii. p. i. 337, t. 22.—H. MŒHL (*Morphol. Untersuch. ueb. d. Eiche* (1862), Cassel, in-4) has established the disposition of the bracts of the bud and the leaves in our indigenous species, the nervation of the leaves, etc.

kins terminated by a flower or by a small number of abortive flowers, spring from the axils of the superior leaves or terminal buds. In this genus, for more than an age, a number of species have been described, doubtless too large, viz.,[1] more than four hundred ;[2] it may be reduced by about one-third.

The *Oaks* can scarcely be distinguished generically from the *Chestnuts*[3] (fig. 189–198), trees of the same countries, the monœcious flowers of which are collected in slender and elongate catkins. The catkins which spring from the axils of the lower leaves are composed only of male flowers; those from the upper axils are androgynous, with female flowers in the axil of their inferior bracts,[1] and higher than the males, often arrested in their development. The flowers of the two sexes are united in glomerules, sometimes reduced to one flower. In the male flower, very analogous to that of the *Oaks*, the sepals, generally six in number, imbricate in two series, surround a diplostemonous or triplostemonous andrœcium. The stamens have a

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[1] M. A. Candolle divides it into six sections: 1. *Lepidobalanus* (Endl. *Gen.* Suppl. iv. p. ii. 24 ;—*Robur*, *Cerroides*, *Erythrobalanos*, *Gallifera*, *Suber*, *Coccifera* Spach, *Suit. à Buffon*, xi. 148 ; *Esculus*, *Ilex* J. Gay). Cupule open, superior, covered with imbricate scales. Male flowers without rudimentary gynæcium, with hairs internally. Catkins slender. Male calyx often irregular.—2. *Androgyne* (A. DC. *Not. Nouv. Car.* 9 ; *Prodr.* 81 ;—*Lepidobalanus* Endl. (part.). Cupule and male fl. as in preced. sect. Gynæcium rud. 0. Divisions of style (3–6) linear, divergent.—Female flower spikes axillary basilar, with caducous male flowers at top. Maturation biennial (*Q. densiflora* Hook. and Arn.).—3. *Pasania* (Miq. *Fl. Ind.-Bat.* i. 480 ; *Ann. Mus. Lugd.-Bat.* i. 108 ; A. DC. *Not. Nouv. Car.* 4 ; —*Lepidobalanus* Endl. (part.) ; — Benth. *Fl. Hongk.* 320). Cupule as in preced. sect. Gynæcium rud. globular in male flower. Male calyx regular. Andrœcium diplostemonous. Catkins erect ; three bracts under flower or glomerules. —4. *Cyclobalanus* (Endl. *loc. cit.* ;—*Gyrolecana* Bl. *Mus. Lugd.-Bat.* i. 299. Cupule open super., covered externally with circular wrinkles, concentric or subspiral, or with folds entire or dentilate. Gynæcium rud. in male fl.—5. *Chlamydobalanus* (Endl. *Gen.* Suppl. iv. p. ii. 28 ;—*Castaneopsis* Bl *Mus. Lugd.-Bat.* i. 228 (not Don) ; — *Encleisocarpon* Miq.). Cupule enveloping all the glands, often unequally divided, covered with salient verticillate and concentric folds. Gynæcium rud. in diplostemonous male fl. Spikes unisexual or androgynous with female flower inferior.—6. *Lithocarpus* (Bl. *Bijdr.* 526 ; *Fl. Jav.* (*Cupul.* 34, t. 20 ;—Miq. *Ann. Mus. Lugd.-Bat.* i. 106, 108 ;—A. DC. *Prodr.* 104, sect. 6. Cupule thick coriaceous with external oblique not numerous wrinkles or folds, inferiorly united within to the gland, which, to a smaller extent, is free above. Fruit osseous. Male flower and inflorescence, as in sects. 4 and 5.

[2] L. *Spec.* 1412.—Thunb. *Fl. Jap.* 175.—Walt. *Fl. Carol.* 234.—W. in *Act. Berol.* iii. 396.—Ait. *Hort. Kew.* iii. 356.—Secondat, *Mém. Hist. Nat. Chên.* (1785).—Michx. *Hist. Nat. Chên. Amer.* (1801). — Michx. f. *Arbr. Amer.* ii.—Bosc. *Journ. Hist. Nat.* ii. 319.—Ten. *Cat. Hort. Nap.* 1819), 65.—H. B. *Plant. Æquin.* 24, t. 75–96.—Bl. *Bijdr.* 618 ; *Fl. Jav.* fasc. 13, 14 (*Cupulif.*), t. 1.—19,20 (*Lithocarpus*) ; *Mus. Lugd.-Bat* i. 296.—Don. *Prodr. Fl. Nepal.* 57.—Roxb. *Hort. Beng.* 113 ; *Fl. Ind.* iii. 634.—Lour. *Fl. Cochinch.* (ed. 1790), 571.—Sm. *Rees Cyclop.* n. 20, 23.—Hook. *Fl. Bor.-Amer.* ii. 159 ; *Icon.* t. 380, 403.—Guss. *Fl. Sic.* ii. 604.—Brend. *Trees of Illin.* 20.—Liebm. *Egesl.* 12.—*Bonplandia*, iii. 38, 52.—Mart. et Gal. *Bull. Brux.* x. n. 3.—Cham. et Schltl, *Linnæa* (1830), 78.—Benth. *Pl. Hartweg.* 55, 90, 348 ; *Fl. Hongk.* 321.—Hook. and Arn. *Beech. Vog. Bot.* 394.—Wangenh. *Amer.* 78.—Torr. *Sitgrave. Exp. Zuni*, 173, t. 19.—A. Gray, *Bot. Mém.* 406 ; *Man.* ed. 5, 450.—Chapm. *Fl. S. Unit. St.* 420.—A. Rich. *Fl. Cub.* t. 73.—Nees, *Kœn. et Sims Ann. Bot.* ii. 100.—Kellog, *Proc. Calif. Acad.* ii. 36.—C. Gay, *Fl. Chil.* v. 396.—Seem. *Voy. Herald. Bot.* 251, 333.—Korth. *Verh. Nat. Gesch. Bot.* 208.—Miq. *Fl. Ind.-Bat.* i. p. i. 844.—Hance, *Hook. Journ.* (1849), 176 ; *Ann. Sc. Nat.* sér. 4, xviii. 229.—Bge, *Enum.* 61.—Jaub. et Spach, *Ill. Pl. Or.* i. 108, t. 54–58.—Fisch. et Mey. *Hohen. Enum. Talysch.* 29.—C. A. Mey. *Verz. Pfl. Cauc.* 44.—Kotschy, *Eich. Europ. und Or.* (1858–62).—Stev. *Verz. Taur. Halb.* 307.—C. Koch, *Linnæa*, xxii. 319, 328.—Lindl. *Paxt. Fl. Gard.* i. 59, t. 37.—Pœch, *Enum. Pl. Cypr.* 12.—Webb, *It. Hisp.* 10.—Santi, *Viag. Tosc.* i. 156, t. 3.—Carruth. *Journ. Linn. Soc.* vi. 32.—Gren. et Godr. *Fl. de Fr.* iii. 115.

[3] *Castanea* T. *Inst.* 584, t. 352.—Gærtn. *Fruct.* i. 181, t. 37.—Lamk. *Dict.* i. 708 ; Suppl. ii. 203 ; *Ill.* t. 782, fig. 1.—Turp. *Dict. Sc. Nat.* Atl. t. 304, 305.—Nees, *Gen.* ii. 25.—Spach, *Suit. à Buffon*, xi. 186.—Endl. *Gen.* n. 1848 ; Suppl. iv. p. ii. 29.—A.DC. *Prodr.* xvi. sect. ii. 113.

Castanea vulgaris.

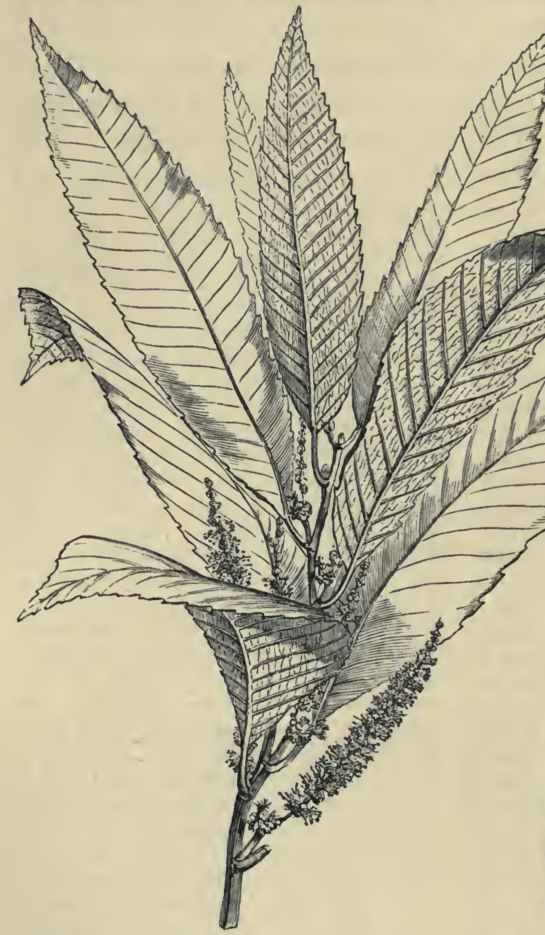

Fig. 189. Floriferous branch.

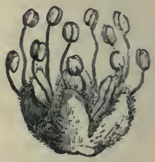

Fig. 190. Male flower (4/1).

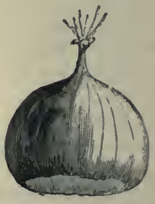

Fig. 196. Median achene, front view.

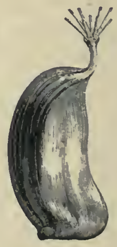

Fig. 197. Lateral achene.

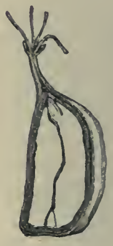

Fig. 198. Long. sect. of achene.

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[1] These bracts are ordinarily larger and thicker than those of the male flowers.

free exserted filament and a small bilocular extrorse anther dehiscing by two longitudinal clefts. In the female glomerules, surrounded by a common involucre, covered with bracts and prickles,[1] there are at adult age one, or oftener three fertile flowers,[2] the receptacle of which has the form of an elongated gourd. Its cavity is filled by the ovary, whilst its margins support six biseriate and imbricate sepals and a variable number[3] of sterile epigynous stamens.[4] The ovary is surmounted by six simple stylary branches, stigmatiferous above and within, corresponding to an equal number of incomplete and biovulate cells.[5] The collateral ovules[6] are descending, more or less completely anatropous, with micropyle superior and exterior.[7] The fruit (fig. 195–198) is an achene crowned with a scar, some-

Castanea vulgaris.

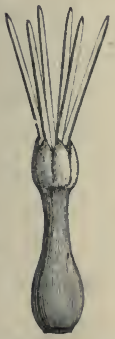

Fig. 193. Female flower ($\frac{4}{1}$).

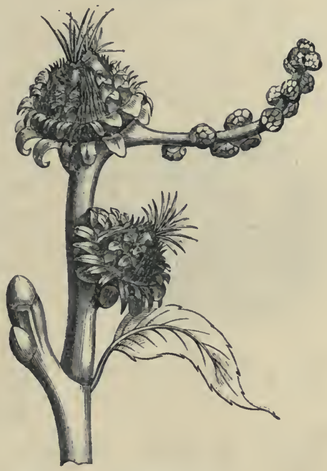

Fig. 191. Androgynous inflorescence.

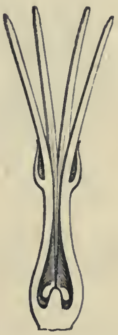

Fig. 194. Long. sect. of female flower.

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[1] The bracts are those of the inflorescence in a biparous cyme and are displaced at adult age. The prickles are of the same nature as the scales on the upper portion of the cupule of the *Oaks*; and it is absolutely necessary to distinguish these two kinds of organs one from the other.

[2] In *C. vulgaris* (*vesca*), there are at first seven flowers belonging to three successive generations; but those of the third generation early become abortive. They are sometimes developed just at the end and may then be males.

[3] They may equal the sepals in number and in that case belong to two series; there are, for example, three large and three small more interior.

[4] Here and there they become fertile. When even they are destitute of pollen, the filament and anther are ordinarily distinct at adult age.

[5] The elements of the gynæcium appear also to belong to two different verticils, and there are often three interior carpels, rather smaller than the exterior with which they alternate.

[6] Their appearance is late, as in the *Betuleæ*, the *Coryleæ* and the *Oaks*.

[7] Their coat is double (J.G. AG. *Theor. Syst. Plant.* t. 13, fig. 10, 11).

times with the remains of the perianth and styles, and inserted, to the number of one to three, by a large basilar surface, in the interior of a closed globular accrescent involucre, covered externally with bracts, which are seen in the female inflorescence, and, besides, with rigid prickles, simple or ramified at the summit,[1] primarily disposed over four equidistant areas, having at first nearly the form of an isosceles triangle with superior apex and separated from each other, at their bases, by groups of bracts which finally conceal them at maturity. At maturity, the involucre opens above in four pannels and allows the achenes to escape. Each of these contains one fertile seed,[2] the embryo (fig. 198) of which, destitute of albumen, has thick farinaceous cotyledons, externally waved or ruminant, sometimes deeply, and a superior radicle concealing the base of the cotyledons. The *Chestnuts* proper are trees of the northern hemisphere. There are probably only two species,[3] one American, the other, with numerous forms and variations, spread over the temperate regions of North America, Asia, Africa, and Europe. The leaves, caducous, are alternate,[4] penninerved, dentate, plicate in vernation according to the principal and lateral nervures,[5] accompanied at the base of the petiole by two lateral stipules which fall early. But it appears impossible

Castanea vulgaris.

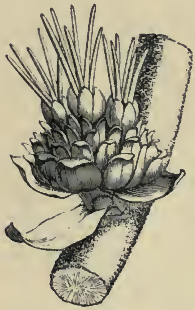

Fig. 192. Female glomerule ($\frac{4}{1}$).

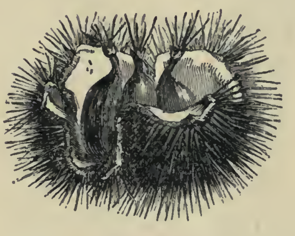

Fig. 195. Compound fruit.

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[1] The lower division, longer than the others, has been considered as representing a modified leaf (A. DC. *Prodr.* 114) in the axil of which should be placed the others shorter and variable in number.

[2] Accompanied near the summit by from two to twelve other seeds sterile and rudimentary, of which one or two here and there may become fertile.

[3] L. *Spec.* 1416 (*Fagus*).—THUNB. *Fl. Jap.* 195 (*Fagus*).—DUHAM. *Arbr.* éd. 2, iii. 66, t. 19.—LOUD. *Arbr.* 912, f. 1707, 1708.—RAFIN. *N. Sylv.* 82.—MICHX. *Arbr. Amer.* i. 166, t. 7.—WANGENH. *Nordam. Holz.* t. 47.—CATESB. *Carol.* 1, t. 9.—ELL. *A Sketch*, ii. 614.—NUTT. *Gen.* ii. 217.—A. GRAY, *Man.* éd. 5, 454.—CHAPM. *Fl. S. Unit. St.* 424. –BGE *Enum.* n. 347, 349.—BL. *Mus. Lugd.-Bat.* i. 285.—SIEB. et ZUCC. *Fl. Jap. Fam.* n. 189, 710.—BENTH. *Fl. Hongk.* 319.—MIQ. *Ann. Mus. Lugd.-Bat.* i. 121.—GREN. et GODR. *Fl. de Fr.* iii. 115.

[4] Disposed according to the fraction $\frac{2}{5}$, or sometimes distichous (DŒLL, *Fl. Bad.* ii. 542).

[5] HENRY, *N. Act. Nat. Cur.* xxii. p. i. t. 28. —DŒLL, *Zur Erklaer. d. Laubkn. Ament.* 25, fig. 21.

to separate from this genus, otherwise than as a section, *C. chrysophylla*,[1] a Californian species, and a certain number of species of tropical and subtropical Asia, such as *C. indica*, *javanica*, and about ten others,[2] of which the genus *Castanopsis*[3] has been made, and which, intimately connecting the *Oaks* and the true *Chestnuts*, differ only from the latter in the number of cells in their ovary, reduced to three. Sometimes the involucre of the fruit, dehiscent or indehiscent, is covered with numerous crowded prickles, inserted apparently, in the adult stage, over the entire extent of its surface; and sometimes, as in *C. sumatrana*, type of a genus *Callæocarpus*,[4] the prickles are conical and spread regularly over three prominent surfaces or form horizontal or oblique series. In these species the leaves are sometimes entire and sometimes dentate. Thus constituted,[5] the genus *Castanea* comprises seventeen or eighteen species.[6]

The *Beeches*[7] (fig. 199–206) were formerly included in the same genus as the *Chestnuts*. They have their monœcious flowers.[8] The males are formed of a gamosepalous subcampanulate calyx, divided above into a number of lobes varying from four to nine, and of an equally variable number (six to eight) of stamens, with a free slender exserted filament in the centre of the flower, and a bilocular extrorse anther dehiscing by two longitudinal clefts.[9] The female flowers, in number from one to three, are enclosed in a common four-lobed involucre covered externally with projections of very variable form, sometimes foliaceous, sometimes representing superposed layers more or less deeply cut, or again, as in our common beech, having the appearance of long and slightly rigid prickles, at least in the upper dorsal portion and the margins of the lobes of the involucre, for towards the base we find more or less foliaceous bracts.[1] Each flower is composed of an inferior, triangular ovary, with three cells separated by thick partitions,[2] from the internal angle of which[3] descend two collateral anatropous ovules, with micropyle directed upwards and outwards.[4] The style is divided, nearly from its base, into three simple elongate slender (fig. 202, 203), or oftener short and thick[6] (fig. 205, 206) branches,[5] covered within and above

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[1] Hook. *Journ. of Bot.* (1843), 496; *Bot. Mag.* t. 4953.

[2] Forming the sect. *Eucastanopsis* A. DC. (*Prodr.* xvi. sect. ii. 109).

[3] Don, *Prodr. Fl. Nepal.* 56 (*Quercus* sect. not Bl.).—Spach, *Suit. à Buffon*, xi. 185.—A. DC. *Seem. Journ. of Bot.* (1863), 128; *Prodr. loc. cit.*

[4] Miq. *Pl. Jungh.* i. 13; *Fl. Ind.-Bat.* i. 868. (part.); *Ann. Mus. Lugd.-Bat.* i. 118.—A. DC. *Prodr.* 112.

[5] Castanea sect. 3.
1 *Eucastanea.*
2 *Castanopsis* (Don).
3 *Callæocarpus* (Miq.).

[6] See p. 233, note 3. Roxb. *Fl. Ind.* iii. 643. —Bl. *Bijdr.* 525; *Fl. Jav.* 42, t. 22.

[7] *Fagus* T. *Inst.* 584, t. 351.—L. *Gen.* (ed. 1), n. 728 (part.).—Lamk. *Dict.* iii. 125; Suppl. iii. 49 *Ill.* t. 782.—Gærtn. *Fruct.* i. 182, t. 37.—Nees, *Gen.* ii. 24.—Mirb. *Mém. Mus.* xiv. t. 23–26.—Spach, *Suit. à Buffon*, xi. 194.—Endl. *Gen.* n. 1847; Suppl. iv. p. ii. 29.—Payer, *Fam. Nat.* 165.—A. DC. *Prodr.* xvi. sect. ii. 117.—*Calusparassus* Hombr. et. Jacquin. *Voy. au Pôle Sud. Bot. Phanér.* t. 6 Σ, 7 Γ, 8 Ψ.—*Calucechinus* Hombr. et Jacquin. *loc. cit.* t. 6 Θ, 7 Z, 8 Π.—*Nothofagus* Bl. *Mus. Lugd.-Bat.* i. 306. —*Lophozonia* Turcz. *Bull. Mosc.* (1858), i.

[8] Here and there they are hermaphrodite, with some epigynous stamens, sterile or fertile (Schinzl. *Bot. Zeit.* (1850), t. 745, t. 8, fig. 1).

[9] According to H. Mohl (*Ann. Sc. Nat.* sér. 2, iii. 312), the pollen is "spherical; three narrow bands, with large umbilica surrounded by a narrow halo. *Fagus sylvatica.*"

Fagus sylvatica.

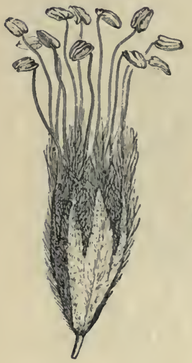

Fig. 200. Male flower ($\frac{5}{1}$)

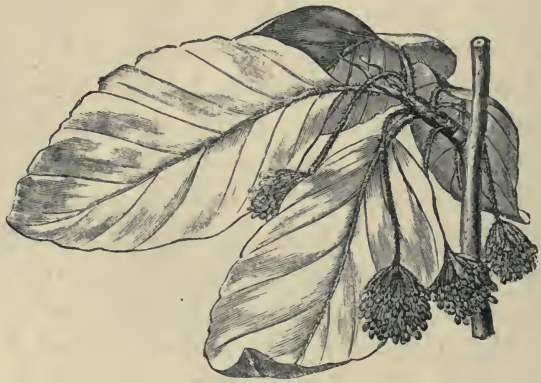

Fig. 199. Male floriferous branch.

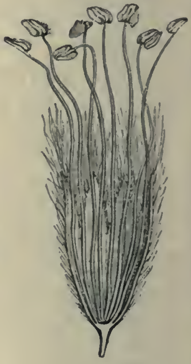

Fig. 201. Long. sect. of male flower.

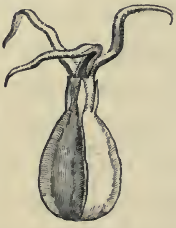

Fig. 202. Female flower.

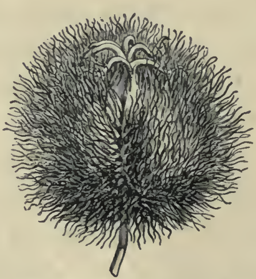

Fig. 204. Young fruit in involucre.

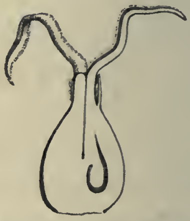

Fig. 203. Long. sect. of female flower.

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[1] Transformed even into small leaves on certain abnormal involucres of the common Beech.

[2] Their transverse section has the form of an isosceles triangle with apex interior.

[3] When this thickened angle separates, at a certain age, from the rest of the partitions, the placenta appears almost centrally free.

[4] With double envelope.

[5] In those of the species of the sect. *Eufagus* (A. DC. *Prodr.* 118;—*Fagus* Bl. *Mus. Lugd.-Bat.* i. 306) which inhabit the northern hemisphere notably in our common Beech.

[6] In the species of the same section which belong to the southern hemisphere.

with stigmatic papillæ. It is surrounded by a superior calyx of six biseriate, imbricate folioles, ordinarily persistent to the summit of the fruit. The latter is dry, triangular, with the angles often produced to narrow rigid vertical wings. It is enclosed either alone or with two or three others, in an accrescent, woody involucre, covered externally with projections variable in size, form and consistence, and finally opening in its upper part by four vertical clefts. In each achene is found one seed[1] the embryo of which, destitute of albumen, has a superior radicle, partly covered by the base of the cotyledons,[2] mostly fleshy, often folded back upon themselves.[3] The *Beeches* are trees or shrubs growing in the temperate or nearly cold regions of both hemispheres.[4] Some attain great dimensions and resemble, in this respect, our common Beech; whilst those which in great number inhabit the cold regions of the western coast of the most southern parts of South America are often, in all their parts, reduced to the humblest dimensions. The leaves are alternate, caducous[5] or persistent, penninerved, generally dentate, convex in the bud and often plicate along the lateral nervures,[7] and accompanied by two lateral caducous stipules. The flowers are precocious, generally axillary, sometimes solitary and sometimes grouped at the summit of a common peduncle, in a sort of capitule or short spike. Some fifteen species have been described.[8]

Fagus betuloides.

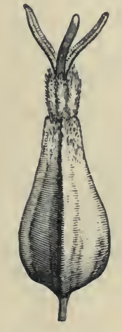

Fig. 205. Female flower ($\frac{4}{1}$).

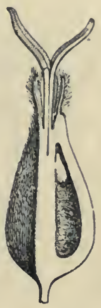

Fig. 206. Long. sect. of female flower.

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[1] Accompanied by abortive seeds.

[2] Epigeous, foliaceous, in germination.

[3] They are probably flat in many small-leaved species of the northern hemisphere. (J. Hook. *Fl. Antarct.* ii. 123).

[4] Except in Africa.

[5] In sect. *Eufagus* (page 238, note 5).

[6] In sect. *Nothofagus* (A. DC. *Prodr.* 121).

[7] Henry, *Nov. Act. Nat. Cur.* xxii. p. i. t. 29. The lateral nervures terminate in the hollows between the teeth of the limb or even at the teeth themselves. (A. DC. *Mém. Genève* (1864), *loc. cit.*).

[8] Forst. *Comm. Gœtting.* ix. 45 (*Betula*).—Duham. *Arbr.* ed. 2, ii. 80, t. 24.—Michx. *Arbr. Amér.* ii. 74, t. 9.—Schkuhr, *Handb.* t. 303.—Loud. *Encycl.* 907.—Hook. *Journ. Bot.* ii. 147; *Icon.* t. 630, 631.—Wangenh. *Nordamer. Holz.* 80, fig. 65.—Reichb. *Ic. Fl. Germ.* t. 639.—Sieb. *Bat. Verh.* xii. 25.—Pœpp. et Endl. *Nov. Gen. et Spec.* ii. 68, t. 195-198.—Hook. f. *Fl. Antarct.* ii. 346, t. 123, 124; *Fl. Tasm.* i. 348; *Fl. N.-Zel.* i. 229; *Man. N.-Zeal. Fl.* 249.—Benth. *Fl. Austral.* v. 209.—C. Gay, *Fl. Chil.* v. 387.—Phil. *Linnæa*, xxix. t. 45.—A. Gray, *Man.* ed. 5, 455.—Chapm. *Fl. S. Unit. St.* 424.—Gren. et Godr. *Fl. de Fr.* iii. 114.—Walp. *Ann.* i. 636; vii. 639 *Lophozonia*).

IV. ? BALANOPS SERIES.

In this genus, the place of which is somewhat doubtful, the flowers are regular and diœcious. The males are naked and disposed in

Balanops Vieillardi.

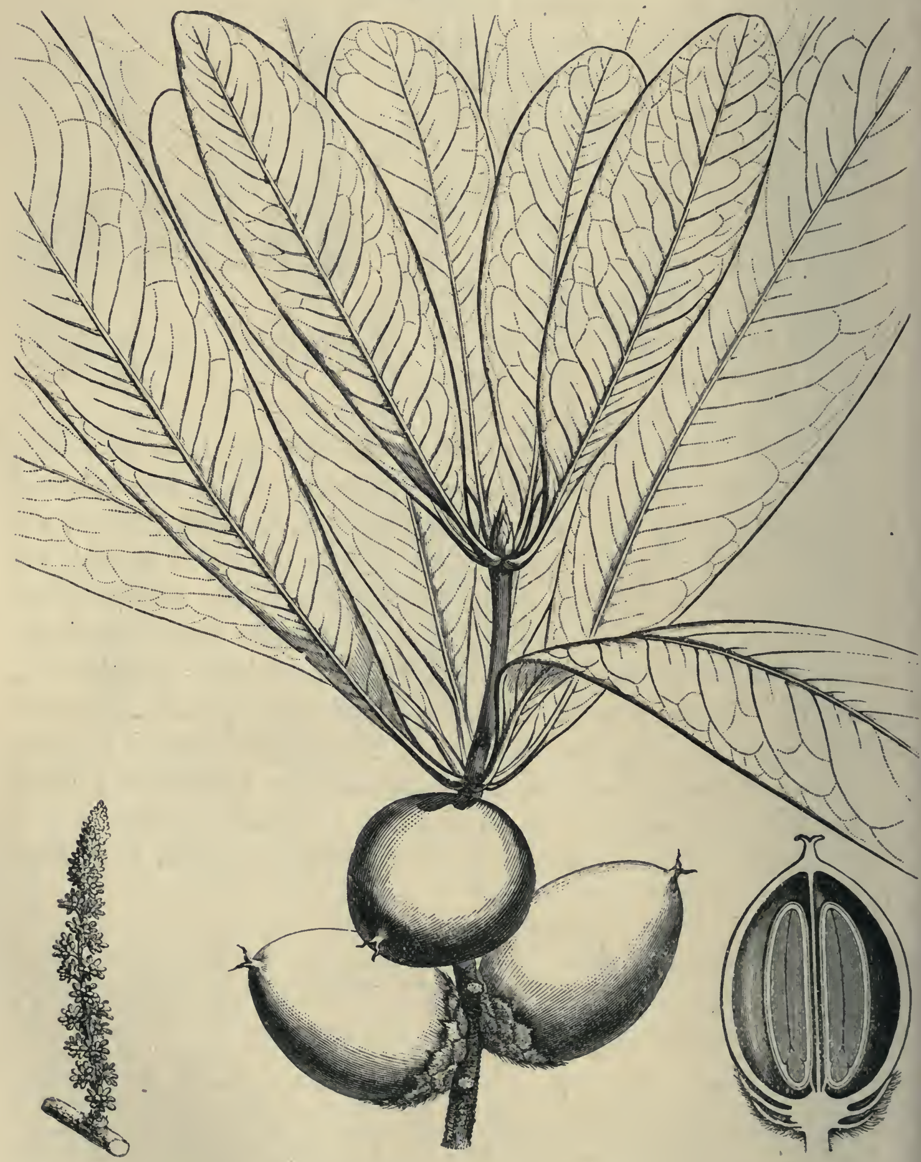

Fig. 208. Male catkin. Fig. 207. Fructiferous branch. Fig. 213. Long. sect. of fruit.

slender catkins (fig. 208), on which they are alternate, nearly sessile, or on a short pedicel, frequently bearing their small axillant bract (fig. 209). Each represents a small bundle of stamens, the number of which varies from two to a dozen, each having a very short erect filament, and a bilocular introrse anther dehiscing by two longitudinal clefts. In the female flower (fig. 210), sessile on the trunk and branches, there are a great many unequal, imbricate, rigid folioles, covered with hairs, which are the parts, either of a calyx, or of an involucre, and, internally, a free gynæcium (fig. 212), the hard conical ovary of which contracts abruptly at the base to a portion with soft coat, and at the summit is produced into two stylary branches, themselves soon bifurcated in two long linear lobes, subulate, exserted, sinuous and covered internally with

Balanops Vieillardi.

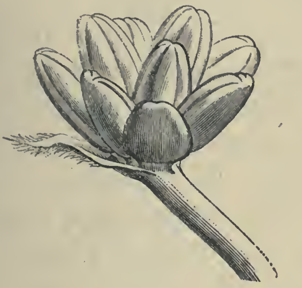

Fig. 209. Male flower ($\frac{4}{1}$).

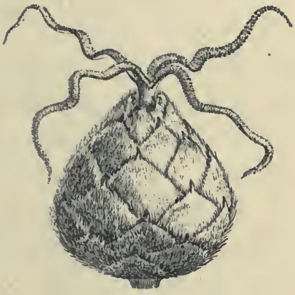

Fig. 210. Female flower ($\frac{2}{1}$).

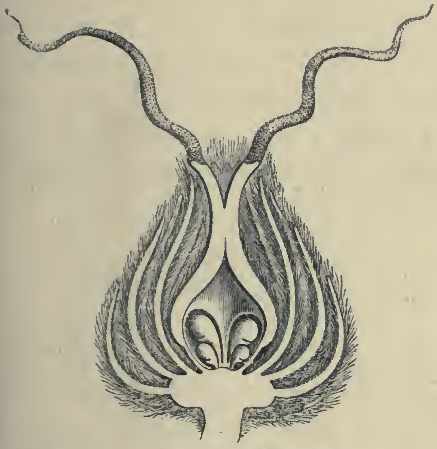

Fig. 211. Long. sect. of female flower ($\frac{4}{1}$).

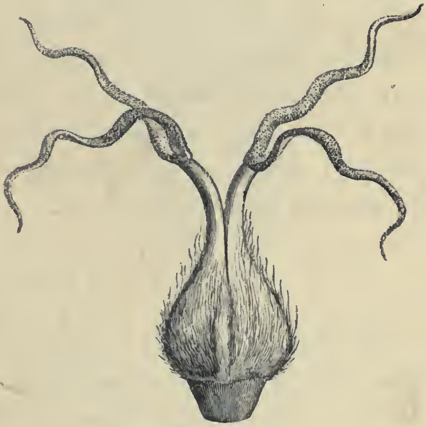

Fig. 212. Gynæcium.

stigmatic papillæ. The cavity of the ovary is divided by narrow parietal partitions into two very incomplete cells, to each of which correspond two ascending anatropous ovules, inserted near the base and supported by a funicle of very variable length,[1] the dilated summit of which forms an obturator to the exterior and inferior micropyle (fig. 211). The fruit (fig. 207, 213), above which persist the withered baselar folioles,[2] forming a sort of cupule similar to that of the Oak (whence the name *Balanops* [3]), is an ovoid berry, with thin coat, membranous endocarp, often not very distinct, the two cells of which, more or less complete, enclose each one or two nearly erect seeds. The latter, under their integuments, contain an erect embryo, with short inferior radicle, thick cotyledons, nearly elliptical, greenish, and surrounded by a thin, often membranous, layer of fleshy albumen. *Balanops* consists of trees or shrubs, the simple or oftener little ramified stems of which bear above leaves almost sessile, simple, penninerved, coriaceous, entire or slightly dentilate, alternate and sometimes collected at the end, presenting the appearance of pairs or verticils. The male inflorescences and the female flowers proceed from a scaly bud borne by the axes in the interval of the leaves. Six or seven species of this genus are known, all natives of New Caledonia.

V. ? LEITNERIA SERIES.

Leitneria[4] (fig. 214—216) has amentaceous and diœcious flowers. The catkins bear a large number of alternate bracts, at first imbricate. In the axil of each bract of the male catkins are found stamens, varying in number from two or three to ten,[5] the free and erect filaments of which support each a bilocular introrse anther, dehiscing by two longitudinal clefts. The stamens are quite naked or surrounded at the base by some unequal bracts, sometimes united so as to form a sort of small perianth. The same may be the case in the female catkins, where these bracts (?) ordinarily attain even a greater development.[1] The gynæcium is formed of a single carpel, the ventral suture of which is opposite the axis of the catkin, and its unilocular ovary is surmounted by a long style, papillous and stigmatic on its entire internal surface, whilst its summit turns outwards.[2] In the internal angle of the ovary, a parietal placenta supports a single descending ovule, incompletely anatropous,[3] with micropyle directed upwards and outwards. The fruit is an oblong drupe, the exocarp of which is of little thickness, coriaceous, and its hard putamen encloses a descending seed, with thin albumen, covering a straight embryo with short superior radicle and greenish fleshy plano-convex cotyledons. *L. floridana* Chapm., the only known species of this genus, inhabits the marshes of the

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[1] In the same cell there are ordinarily one shorter, straight, and another much longer, often a little sinuous.

[2] Which gives it an external resemblance to an acorn, though here the fruit is superior. It is crowned with the remains of the style; its colour is ordinarily that of a dried jujube.

[3] H. Bn. *Adansonia*, x. 117, 337.

[4] Chapm. *Fl. S. Unit. St.* 426.—C. DC. *Prodr.* xvi. sect. ii. 154.—Hook. f. *Icon.* n. sér. i. 33, t. 1044.

[5] Very often there are half a dozen. It is ordinarily in the flowers at the summit that the number may be reduced to two or three.

Leitneria floridanea.

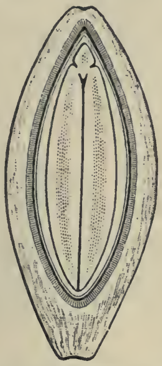

Fig. 216. Long. sect. of fruit ($\frac{2}{1}$).

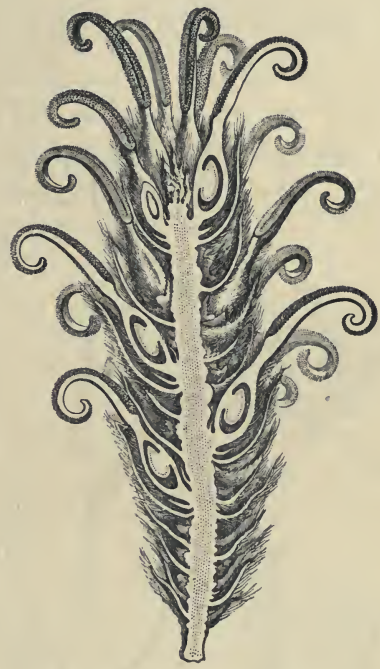

Fig. 215. Long. sect. of female inflorescence ($\frac{4}{1}$).

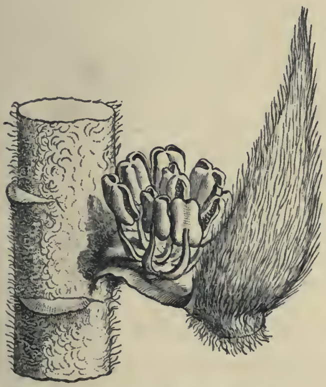

Fig. 214. Male flower ($\frac{8}{1}$).

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[1] Here and there are female flowers with one or more fertile stamens within this false calyx.

[2] It is traversed by a vertical furrow, the thick margins of which are reflexed and papillous.

[3] "Amphitropous." (Chapm.)

southern United States. It is a shrub the leaves of which remind us of those of the Willows and Chestnuts; they are alternate, petiolate, accompanied by lateral stipules; oblong, pointed, penninerved, entire, tomentose beneath. The flowers develop before them, on the wood of the branches where the catkins occupy the axil of the fallen leaves. The stamens are somewhat raised with the contracted base of the axillant bracts.[1]

VI. MYRICA SERIES.

The flowers are equally amentaceous in the *Myreceæ*[2] (fig. 217—225), and are likewise destitute of a true perianth; most generally, as in the indigenous species, *Myrica Gale* L. (fig. 217—223), they are diœcious and borne on simple catkins. In this species, in the

Myrica Gale.

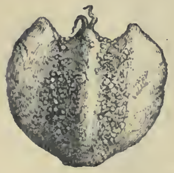
Fig. 222. Fruit ($\frac{3}{1}$).

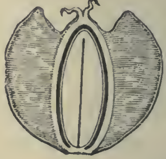
Fig 223. Long. sect. of fruit.

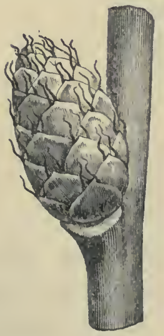
Fig. 219. Female catkin ($\frac{3}{1}$).

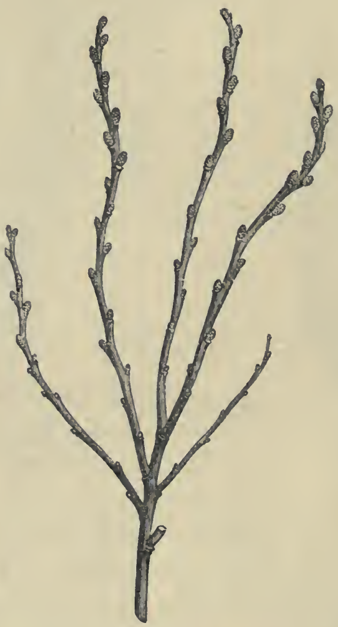
Fig. 217. Young male floriferous branch.

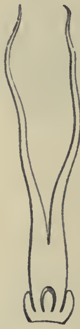
Fig. 221. Long. sect. of female flower.

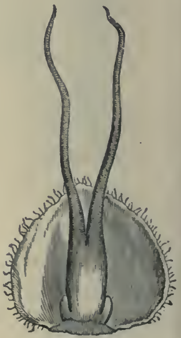
Fig. 220. Female flower ($\frac{5}{1}$).

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[1] Here perhaps will be placed the genus *Didymeles* Dup.-Th. doubtfully referred by us to the *Zanthoxyleæ* (*Hist. des Plant.* iv. 392, note 1), and which with C. De Candolle (*Prodr.* xvii. 292), as with Meissner (*Gen. Comm.* 256) is perhaps a *Myrica.* Its carpels, grouped in pairs face to face, are organized like those of *Leitneria*, but its stamens are also in pairs on the common axis of the catkin facing each other.

[2] *Myrica* L. *Gen.* ed. 1, n. 746 (part.).—J. *Gen.* 409, 453.—Gærtn. *Fruct.* i. 190, t. 39.—

axil of each scale of the male catkin, are found stamens, varying from two to five in number (fig. 218); but most frequently there are four, one anterior, one posterior, and two lateral. The filaments are free except quite at the base, where they are monadelphous, and the anthers are bilocular, introrse, and dehiscent by two longitudinal clefts.[1] In the female catkin (fig. 219), the axil of each scale is occupied by a sessile flower, accompanied by two lateral bracts.[2] Otherwise the gynæcium is naked, and composed of a unilocular ovary, surmounted by a style almost immediately divided into two long subulate branches, primarily anterior and posterior,[3] and covered with red stigmatic papillæ. In the interior of the ovarian cell is inserted at the base an ovule, which appears erect, and is orthotropous, that is to say its micropyle is superior.[4] When this ovary becomes a drupaceous fruit, with mesocarp slightly fleshy, and epicarp covered with glandular and resinous projections, the two lateral bracteoles, in this species persistent, form, as it were, two thick marginal wings (fig. 222, 223). The seed, erect, contains under its coat, a fleshy embryo, destitute of albumen, with superior radicle and thick plano-convex cotyledons. *M. Gale*, of which a distinct genus has been made,[5] is a small odorous shrub, living socially in the marshes of temperate Europe and North America. Its leaves are alternate, simple, serrulate, penninerved, without stipules. The catkins occupy the axils of the leaves of the preceding year (fig. 217), and the flowers bloom in the spring before the leaves of the year have attained their full development.

Myrica Gale.

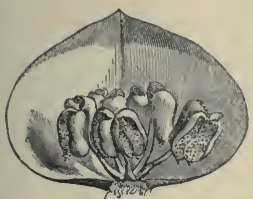

Fig. 218. 5-androus male flower.

In *M. asplenifolia* (fig. 224, 225), of which the genus *Comptonia*[6] has been made, the leaves are pinnatifid, accompanied by stipules (wanting in other species of the genus), and in the axil of the lateral

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Lamk. *Dict.* ii. 592; Suppl. ii. 696; *Ill.* t. 809. —Schkuhr, *Handb.* t. 322.—Turp. *Dict. Sc. Nat.* Atl. t. 298.—Nees, *Gen.* fasc. 3, tab.—Spach, *Suit. à Buffon*, xi. 260.—Endl. *Gen.* n. 1839 (part.).—C. DC. *Prodr.* xvi. sect. ii. 147 (incl.: *Comptonia* Banks, *Faya* Webb, *Gale* J. Bauh. *Nageia* Gærtn.).

[1] The pollen is "flattened, ellipsoid, somewhat triangular; three small pores at the angles, with large haloes." (H. Mohl, *Ann. Sc. Nat.* sér. 2, iii. 312.).

[2] They may be transformed to stamens or bear a stamen in their axil.

[3] Later they become lateral.

[4] There is only one ovular envelope.

[5] *Gale* J. Bauh. *Hist.* ii. 223.—Spach, *loc. cit.* 258.

[6] Banks, *Gærtn. Fruct.* ii. 58, t. 90.—Spach, *loc. cit.* 264.

bracts there is a rudimentary flower very imperfectly developed, and sometimes described as a gland or bud. In many American and Cape species, the female flower is surrounded by three or four bracteoles, sometimes resembling a small calyx. These appendages may also be observed around the base of the stamens, as in *M. nagi*,[1] a Japanese plant, and in many Mexican and Columbian species. In some others from the same countries, and in *M. Œthiopica*, the flowers are monœcious, and those of the two sexes are found united in the same catkin. In such case, the males, in goodly number, occupy the lower portion of the axis of the inflorescence and its ramifications, and the females the summit. The latter, however, is simple; whilst in the Asiatic species, and in *M. Faya*, a plant of the Canaries, Madeira, the Azores, and the Spanish peninsula, for which it has also been proposed to establish a distinct genus,[2] the male catkins are compound, and represent each one of the divisions, sometimes pretty numerous, of a ramified cluster. The male flowers are not, as in many other sections of the genus, accompanied by bracteoles. The genus *Myrica* includes about thirty-five species,[3] and inhabits all parts of the world, chiefly the temperate regions.

Myrica (*Camptonia*) *asplenifolia.*

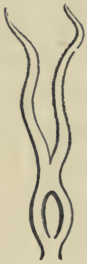

Fig. 225. Long. sect. of female flower.

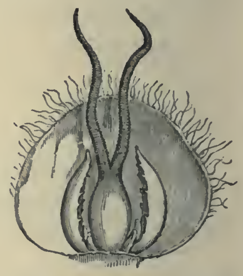

Fig. 224. Female flower with bracts (4/1).

This family, still perhaps heterogeneous with the limits here assigned to it, was still more so till recently. It was established by ADANSON, in 1763, under the family name of *Castaneæ*.[4] With him it comprised only three sections, of which the first only corresponds to the group under consideration. A. L. DE JUSSIEU [1] did not sensibly modify its extent; and it is not known why he changed the name to *Amentaceæ*. In 1808, L. C. RICHARD [2] subdivided it into *Myriceæ*,[3] then into *Betulinæ* [4] and *Cupuliferæ*.[5] B. MIRBEL, in 1815,[6] distinguished the Family *Corylaceæ*. To the older genera, eight in number, constituting the three secondary groups, viz., *Betula*, *Alnus*, *Corylus*, *Carpinus*, *Quercus*, *Castanea*, *Fagus*, and *Myrica*, were added, in 1806, *Didymeles*, of DUPETIT-THOUARS; [7] and, in 1860, *Leitneria*, discovered by CHAPMAN.[8] In 1871 we published [9] *Balanops*, bringing the total number of genera in this family up to eleven, distributed in six series characterized as follows:—

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[1] Type of the g. *Nageia* (GÆRTN. *Fruct.* i. 191, t. 39, fig. 8).

[2] *Faya* WEBB, *Phyt. Canar.* iii. 372.

[3] L. *Spec.* 1418 (*Liquidambar*), 1453; *Mantiss.* 298.—THUNB. *Fl. Jap.* 76; *Fl. Cap.* (ed. SCH.), 153, 158.—W. *Spec.* 746.—JACQ. *Ic. Rar.* t. 625; *Fragm.* ii. t. 1, fig. 4.—DUHAM. *Arbr.* ed. 2, t. 55, 56.—H. B. K. *Nov. Gen. et Spec.* ii. 17, t. 98.—MIRB. *Mém. Mus.* xiv. t. 27, 28.—MICHX. *Fl. Bor.-Amer.* ii. 620.—BL. *Bijdr.* 517; *Fl. Jav. Myric.*—AIT. *Hort. Kew.* iii. 396.—ROXB. *Fl. Ind.* (ed. 1832), iii. 765.—WALL. *Tent. Fl. Nepal.* 59, t. 45.—WIGHT, *Icon.* t. 764.—WATS. *Dendrol.* ii. 166, t. 156 (*Comptonia*).—A. RICH. *Tent. Fl. Abyss.* ii. 277.—CHAM. et SCHLTL. *Linnæa*, vi. 336.—REICHB. *Ic. Fl. Germ.* xi. t. 620.—TAUSCH, in *Flora* (1831), 671.—SIEB. et ZUCC. *Abh. d. Baier. Akad. d. Wissensch.* iv. 3, 230.—BUCH. in *Flora* (1845), 89.—BENTH. *Pl. Hartweg.* 251, 266; *Fl. Hongk.* 322.—GRISEB. *Pl. Wright.* 177; *Fl. Brit. W.-Ind.* 177.—MIQ. *Fl. Ind.-Bat.* i. 872; *Mus. Ludg.-Bat.* iii. 129.—A. GRAY, *Man.* ed. 5, 457, 458 (*Comptonia*).—CHAPM. *Fl. S. Unit. St.* 426, 427 (*Comptonia*).—GREN. et GODR. *Fl. de Fr.* iii. 151.—WALP. *Ann.* i. 738.

[4] *Fam. des Pl.* ii. 366 (*Castaneæ*).

I. BETULEÆ.—Flowers with male perianth, incomplete or little developed. Gynæcium superior, naked. Ovary bilocular. Ovule in each cell solitary,[10] descending. Fruit dry. Trees or shrubs, with alternate leaves, lateral stipules. Flowers in unisexual catkins. —2 genera.

II. CORYLEÆ.[11]—Flowers without male perianth. Gynæcium inferior, surmounted by a short superior calyx. Ovary bilocular. Ovule in each cell solitary, descending. Fruit dry, with membranous sacciform or expanded induvium.—Leaves alternate, with lateral stipules. Flowers in unisexual catkins; the females budlike.—2 genera.

III. QUERCINEÆ.[12]—Flowers with male perianth complete or nearly so. Gynæcium inferior, surmounted by a superior calyx. Ovary 2-10-locular.[13] Ovules geminate, descending in each cell. Fruit dry. Involucre hard, covered with excrescences very variable in form, and surrounding one or more fruits.—Leaves generally alternate, with lateral stipules. Flowers in simple or mixed catkins, or in cymes.—3 genera.

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[1] *Gen.* (1789), 407, Ord. 4.

[2] *Anal. du Fruit*, 193.

[3] *Myriceæ*. A. RICH.—BARTL. *Ord. Nat.* 98. —ENDL. *Gen.* 271, Ord. 37.—*Myricaceæ* LINDL. *Veg. Kingd.* (1846), 256, Ord. 71.—C. DC. *Prodr.* xvi. sect. ii. 147.

[4] *Betulineæ* L. C. RICH. ex A. RICH. *Elém.* (ed. 4), 562.—*Betulaceæ* BARTL. *Ord. Nat.* 99.—LINDL. *Introd.* ed. 2, 171.—ENDL. *Gen.* 272, Ord. 88.—REG. *DC. Prodr.* xvi. sect. ii. 161, Ord. 195.

[5] RICH. *Anal. du Fruit*, 32, 92 (1808).—BARTL. *Ord. Nat.* 99. —LINDL. *Introd.* ed. 2, 170.—ENDL. *Gen.* 273, Ord. 89.

[6] *Elém. de Phys. Vég. et de Bot.* ii. 906.

[7] *Gen. Nov. Madag.* 89.

[8] *Fl. S. Unit. St.* 427.

[9] *Adansonia*, x. 117.

[10] Rarely two are observed in each cell, one generally imperfect..

[11] PAYER, *Fam. Nat.* 163, Fam. 73.

[12] J. *Dict. Sc. Nat.* Suppl. ii. 12 (1816),—PAYER, *loc. cit.* 164, Fam. 74.—*Cupuliferæ* RICH. (part.).—A. DC. *Prodr.* xvi. sect. ii. 1, Ord. 194.

[13] The most ordinary numbers being 3 in *Quercus* and 6 in *Castanea*.

IV ? BALANOPSEÆ.—Male flowers naked. Gynæcium superior, surrounded by numerous imbricate folioles (calyx ?). Ovary with two incomplete cells. Ovules geminate, ascending. Fruit fleshy. Seed with albumen of little thickness.—Leaves alternate or subverticillate, without stipules. Male flowers in catkins; female flowers sessile on the branches.—1 genus.

V ? LEITNERIEÆ.—Male flowers naked. Gynæcium superior, surrounded or not by a rudimentary calyx (?). Ovaries solitary or geminate, unilocular. Ovule solitary, inserted in the internal angle, descending. Fruit drupaceous. Seed with albumen of little thickness or nil.—Leaves alternate, with or without stipules. Flowers in simple or compound catkins.—2 genera.

VI ? MYRICEÆ.—Male flowers naked or furnished with a rudimentary calyx (?). Gynæcium superior, generally naked. Ovary unilocular. Ovule solitary, erect, orthotropous, with superior micropyle. Fruit drupaceous. Seed with little or no albumen.—Leaves alternate with lateral stipules. Flowers in 1- or 2-sexual catkins.—1 genus.

Such are the characters the value of which suffices to distinguish the series one from another. Those which, in the same series, distinguish the genera, are more considerable. They are: the degree of development of the perianth, the number of stamens or of anther-cells, and of the ovarian cells; the form, style, consistence, and mode of dehiscence of the involucre, the number of female flowers it contains, the mode in which it envelops the fruit or remains flat or open below it or at its side; the configuration of the cotyledons, their situation epigæous or hypogæous in germination. The characters constant in the entire group are, consequently: diclinous, apetalous flowers, inflorescence in catkins or spikes very analogous; the woody consistence of the stems; the definite number of ovules, solitary or geminate, the outward direction of the micropyle; the great development of the cotyledons, which are always thick and fleshy.

The affinities[1] of this group are easily derived from this collection of characters. It is scarcely separable from the *Ulmaceæ* to which, as we have seen, ADANSON had united it. Only normally among the *Castaneaceæ*, there are not the polygamous flowers of the Elms, nor the stipules characteristic of the *Artocarpeæ*, nor the peculiar disposition of the staminal filaments of the *Moreæ*, nor the opaline or milky latex of the two latter groups. Moreover, at adult age, the greater part of the *Castaneaceæ* preserve in the ovary more than one ovuliferous cell, which is the case with no one of the *Ulmaceæ*. On the other hand, by the *Betuleæ*, the family before us borders on the amentaceous groups of the *Euphorbiaceæ*, such as the *Scepeæ* and *Antidesmeæ*; and by the *Coryleæ*, to the series of *Saxifragaceæ* which comprise the *Plataneæ* and *Hamamelideæ*. In fact, as we have elsewhere said,[1] it is not simply a resemblance of foliage and of habit that is found between the Alders and certain *Fothergilla* or *Parrotia*, or between *Corylopsis* and *Corylus*; for these latter, with their inferior ovary and descending ovules, perfectly definite in number, in cells at first incomplete, seem to be only amentaceous and apetalous representatives of *Corylopsis* and neighbouring *Hamamelideæ*. Hence an analogy between the *Quercineæ* and *Coryleæ* and the *Cornaceæ*, which themselves have so many points of agreement with the *Hamamelideæ*. Take away the involucre and all those accessory organs of tardy growth, which form the cupules and spinous sacs of the *Coryleæ* and *Quercineæ*, and the flower with inferior ovary of the Oaks, Chestnuts, &c., is altogether, in construction, that of the apetalous *Combretaceæ*, notably of *Terminalia*, which often also have apetalous, diclinous flowers in spikes, or amentiform capitules (*Anogeissus*, *Ramatuella*, *Conocarpus*), and the placentæ of which, parietal at first, like those of *Quercus* or *Castanea*, but remaining so to the end, bear in like manner ovules definite in number, descending, with micropyle exterior and superior. Finally, by the *Myriceæ*, this family approaches the *Juglandeæ*, the unilocular ovary of which likewise encloses a single orthotropous and erect ovule;[2] but the independence of the gynæcium in *Myrica* suffices to distinguish it immediately from them.[3]

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[1] As it is still, with series so different one from another in their organization, this family remains, in our view, a collection of degenerate, diminished types which are to the *Malvoideæ* and *Urticoideæ*, by the *Ulmaceæ*, *Artocarpeæ*, and *Betulineæ*, and to the *Combretaceæ*, *Hamamelideæ*, *Plataneæ*, by the *Quercineæ* and *Coryleæ*, what the *Antidesmeæ* are to the *Euphorbiaceæ*, the *Juglandeæ* (perhaps) to the *Terebinthaceæ*, the *Garryaceæ* to the *Corneæ* and *Hamamelideæ*, the *Lacistemeæ* to the *Bixaceæ*, the *Myosurandreæ*, and the *Datisceæ* to the *Cunonicæ*, the *Silicineæ* (perhaps) to the *Tumariscineæ*, &c. J. G. AGARDH (*Theor. Syst.* 159, 162, 174) considers the *Coryleæ* as representing perhaps a reduced form of the *Dipterocarpeæ*, the *Myrobalaneæ* as

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collateral to the superior *Cupuliferæ* and to the *Aquilarineæ*, pointing out also, in the same work, their affinity with the *Betuleæ*.

[1] See *Adansonia*, x. 137.

[2] M. CLARKE (*Ann. Nat. Hist.* (1858), 100) considers *Myrica* as intermediate between *Amentaceæ* and *Urticeæ*.

[3] *Leitneria* seems to unite the *Amentaceæ* to the Willows. *Balanops* has a fruit and habit resembling the *Sapotaceæ*; it represents perhaps an apetalous and amentaceous form of it.

The total number of species in this family is estimated at about four hundred and twenty-five. The series *Quercineæ* itself comprises three hundred and fifteen. The *Coryleæ* are twenty in number; the *Betuleæ*, twenty-eight; the *Myriceæ*, thirty-five. All the genera composing these groups are common to both worlds. On the other hand, *Leitneria* is confined to a very limited portion of America, and *Didymeles* to Madagascar. *Balanops* has been observed only in New Caledonia. In the south of South America, as also in Australia and New Zealand, the family is represented by those curious species of Beech which belong to the section *Nothofagus*, or by *Fagus antarctica*, which grows as far as Cape Horn. In North America *F. ferruginea* inhabits nearly the same regions as *F. sylvatica* in Europe, the latter ascending in Norway as far as the 60th degree. The common Chestnut extends over a vast area of the Mediterranean region and central Asia, from Portugal to Japan; in America it is replaced by *Castanea pumila.* The Oaks grow in all the northern hemisphere, and between the tropics. The Hornbeams ascend in Europe to Sweden, and in America to Newfoundland and Canada; *Corylus Avellana*, in Norway as far as 65°; and *C. Americana*, to Canada, and in Asia to the river Amour. In Europe the Birches are found as far as Ireland, and Cape North, in Lat. 71°; whilst in Norway the Beech scarcely exceeds 60°,3, the Oak 60°,5, and the Blackthorn 65°,3.[1] In the submarine forests on many European shores, Oaks, Blackthorns, and Birches[2] are observed in great number. The most cosmopolitan genus of this family is, doubtless, *Myrica,* since it is seen in Europe from Lapland to Portugal; in Africa from the Azores and Canaries to the Cape of Good Hope; and, in the East, in Abyssinia and Madagascar; whilst it is equally represented in America, from Labrador to Mexico, in Columbia and Peru; in Japan, in India, in Java and New Caledonia.

USES.—It is for their wood[3] chiefly that the *Castaneaceæ* are prized; and it is unnecessary to insist upon the qualities of that of the Oak, Chestnut, Beech, Hazel, Blackthorn, Elm, and Birch. The bark of the Oak is, besides, employed for its astringent properties. Dried and reduced to powder, it forms tan, used principally in dressing skins. From it is extracted tannin, much used in medicine as a tonic, febrifuge, &c. With us the bark used for these purposes is that of *Q. robur*[1] (fig. 181—188), particularly the variety with female flowers and sessile fruit;[2] and that which is pedunculate,[3] often designated by the name of White Oak.[4] The acorns are rich in fecula, but are so unpalatable that they cannot be used as food for man without a preparation too costly to admit of this sweet fecula being brought into common use. They serve only to feed animals, especially pigs. There are many other species of *Quercus*, the fruit of which is sweet and edible. In Europe, *Q. Ilex*,[5] *Ballota*,[6] and even the Cork-oaks are mentioned. The latter are two in number, *Q. Suber*[7] and *Q. occidentalis*,[8] distinguished one from the other chiefly by the time required for maturing the fruit;[9] but both presenting this peculiarity, that their suberose layer, at a certain age, takes an enormous development.[10] At first it consists only of a

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[1] A. DC. *Géogr. Bot. Rais.* 279, 305, 311, 328, 473, 530, 616, 807, 1064.

[2] Among the fossil genera, abundant in recent strata, are especially cited those established by UNGER (*Chlor. Protog.*), under the names of *Carpinites, Fagites, Fegonium, Quercinium, Quercites.* (See ENDL. *Gen.* Suppl. iv. p. ii. 30).

[3] Generally it is that which has been most studied histologically, and it is that which has often served as type for the general descriptions

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of the anatomy of the stems of the *Dicotyledons* (see Kies. *Mém. sur l'Organis. des Pl.* (1814), t. 14 (*Quercus*).—Mirb. *Mém. Mus.* xiv. (1818), 31 (*Fagus*).—G. de Busareig. *Ann. Sc. Nat.* sér. 1, xxx. t. 7–9 (*Quercus*).—Link, *Elem.* (1837) t. 4; *Icon. An. Bot.* fasc. i. vi. 4–15 (*Betula*).—Trevir. *Phys. Gew.* (1835), i. t. iii. 34–36 (*Fagus*).—Dutroch, *L'Institut.* n. 192 (*Quercus*).—Bischoff, *Lerhb.* t. 2 (*Quercus*).—C. H. Schulz, *Nov. Act. Nat. Cur.* (1841), xviii, Suppl. ii. t. 33 (*Betula*).—H. Mohl, *Bot. Zeit.* (1855), 880 (*Fagus, Betula*).—Hartig, *Bot. Zeit.* (1859) 94, 97 (*Fagus*).—Hoffmann, *Z. Kenntn. d. Eichenholtz. Flora* (1849), 369.—Hook. f. *Fl. Antarct.* i. 300, t. 107 (*Fagus*).—Schacht, *Der Baum* (trans. E. Morren), 425, 426 (char. of the wood and bark).

[1] *Quercus Robur* L. *Spec.* 1414.—A. DC. *Prodr.* xvi. sect. i. 4, n. 1.—Guib. *Drog. Simpl.* ed. 6, ii. 286.—Mér. et Del. *Dict. Mat. Méd.* v. 585.—Rosenth, *op. cit.* 185.

[2] *Q. sessiliflora* Martyn.—Sm. *Brit. Fl.* iii. 1026.—Gren. et Godr. *Fl. de Fr.* iii. 116.—Rosenth. *op. cit.* 184,—Berg et Schm. *Darst. Off. Gew.* t. vii. f. (*Chêne à grappes, C. rouge, C. mâle, Roure, Rouve, Roble*).

[3] *Q. pedunculata* Ehr. *Arbr.* 77.—Berg. et Schm. *op. cit.* t. viii. a (*Q. Robur*).—*Q. racemosa* Lamk. *Dict.* i. 715.

[4] *C. femelle, Gravelin.*

[5] L. *Spec.* 1412.—A. DC. *Prodr.* n. 73.—*Q. Gramuntia* L.—*Q. calicina* Poir. *Dict.* Suppl. ii. 217.—*Suber angustifolium non serratum* Duham. *Arbr.* ii. 291, t. 2 (*Yeuse, Quesne*).

[6] Desf. *Act. Acad. Par.* (1790), c. ic.; *Fl. Atl.* ii. 350.—*Q. Castellana* Poir. *Dict.* Suppl. ii. 226 (?)—*Q. rotundifolia* Lamk. (var. by M. A. De Candolle (*Prodr.* 39) of the *Q. Ilex*). It has been thought (Rosenth. *Syn. Pl. Diaphor.* 186) that the acorn of this species was used to make the *racahout* of the Arabs.

[7] L. *Spec.* ed. 2, 1413.—Duham. *Arbr.* ed. 2, 7, t. 45.—Nees, *Pl. Off.* Suppl.—Hayne, *Arzn. Gew.* 12, t. 43.—A. DC. *Prodr.* n. 75 (*Alcornoque, Surier, Rusque, Leuge*).

[8] J. Gay, *Bull. Soc. Bot. de Fr.* iv. 445; in *Ann. Sc. Nat.* sér. 4, vi. 445.—A. DC. *Prodr.* n. 81.—*Q. Suber* Kotsch. *Eich.* t. 33.

[9] It is biennial in the latter, and maturation takes place the same year in the true *Q. Suber*.

[10] On the production of Cork, see H. Mohl, *Ucb. d. Entwickel. des Korkes* (1836); *Ueb. d. Wieder-ersatz des Korkes bei* Q. Suber [*Bot. Zeit.* (1848), 361].—Hanst. *Unters. über d. Bau und*

few layers of uncoloured cells in radiating series under the epidermis of the stems. More internally, the parenchyma, filled with chlorophyl, is mingled with a mass of larger and uncoloured cellules. In the course of the second or third year, these latter become more compact, and their coat increases in thickness, whilst the interposed cells become dry and dark coloured. The suberose layer thickening still more during the fourth and fifth year, the epidermis bursts, and the mass of cork thenceforth increases in thickness, a new layer being formed each year. The annual zones are separated by interposed layers of periderm, of a deeper colour. At the age of from ten to fifteen years, vertical rectangular plates of this cork, called *male*, are cut, under which are found the liber and deep portions of the cortical parenchyma. Outside of this, layers of cork are produced and cut every seven or eight years; the quality of this cork, called *female*, is very superior. This work is carried on principally in the south-west of Europe (particularly France), and in the north-west of Africa. Another Mediterranean species, *Q. coccifera*,[1] nourishes the Kermes, formerly celebrated in industry as a dye, and in medicine forming the base of the famed *Alkermes confection.* The gall-nuts of the Levant, the best employed in therapeutics and the arts, are developed after the puncture of a hymenopterous insect, *Diplolepis gallæ tinctoriæ*; the female of which pierces the scarcely formed buds of *Q. lusitanica*,[2] a Mediterranean species, to deposit her eggs in the interior. The bud becomes hypertrophic by the accumulation of a large quantity of tannin and fecula, on which the young insect, emerging from the egg, feeds, until it pierces the gall and comes forth in a perfect state. Many other Oaks, especially the Green Oak, *Q. robur*, and, in the south-west of France, the Tauzin Oak,[3]

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d. Entw. d. Baumrinde. Berlin (1853).—C. DC. *De la Production Nat. et Art. du Liége* (*Mém. Soc. Gen.* xvi.).—Duchtre, *Elém.* 157.

[1] L. *Spec.* 1413.—Webb, *It. Hispan.* 15.—A. DC. *Prodr.* n. 104.—Guib. *Drog. Simpl.* ed. 6, ii. 289.—Hayne, *Arz. Gew.* t. 44.—*Q. pseudo-coccifera* Desf. *Fl. Atl.* ii. 349.—Boiss. *Voy. Esp.* 578, t. 165.—*Q. Mesto* Boiss. *op. cit.* t. 166.—*Q. Auzandri* Gren. et Godr. *Fl. de Fr.* iii. 119.

[2] Lamk. *Dict.* i. 719 (1783).—Webb, *Ot. Hisp.* 11.—A. DC. *Prodr.* n. 19.—*Q. Infectoria* Oliv. *Voy.* i. 252, t. 14, 15.—Guib. *Drog. Simpl.* ed. 6, ii. 282, fig. 418.—Mér. et Del. *Dict. Mat. Méd.* v. 581.—Berg. et Schm. *Darst. Off. Gew.* t. xxix. *b.*—*Q. Canariensis* W. *Enum. Hort. Berol.* 975.—*Q. rigida* C. Koch, *Linnæa*, xix. 15.—*Q. Mirbeckii* Dur. *Rev. Bot.* ii. 426.—*Q. brachycarpa* Kotsch.—*Q. Cypri* Kotsch.—*Q. Pfæffingeri* Kotsch.—*Q. Gallæ turcicæ* off.

[3] *Q. Toza* Bosc, *Journ. d'Hist. Nat.* ii. 155, t. 32, fig. 3.—A. DC. *Prodr.* n. 4.—Gren. et Godr. *Fl. de Fr.* iii. 117.—*Q. Pyrenaica* W. *Spec.* iv. 451.—Lamk. *Ill.* t. 779.—*Q. Nigra* Thore, *Land.* 381 (not L.).—*Q. Tauzin* Pers. *Enchirid.* ii. 571.—*Q. stolonifera* Lap. *Abr.* 582.—*Q. brossa* Bosc. *Mém.* 15.

bear on their different organs—buds, leaves, and fruit—galls produced in a similar manner, but very different in form, colour, and consistence; and generally very inferior in quality to those first mentioned.[1] All serve equally for the production of tannin, and the preparation of numerous medicaments, ink, dyes, &c. The species used for dyeing and dressing skins, all rich in tannin, are also very numerous in both worlds. The most celebrated are the Yellow Oak[2] of North America, the Red,[3] White,[4] Cinder,[5] and Bi-coloured[6] Oaks of the same country; in France, the Burgundy Oak;[7] in the Levant, the Velane Oak;[8] not to mention all the species of secondary interest possessing the same properties, and of which industry employs either the wood, or the bark, or the acorns.[9] The Chestnuts, so little distinct generically from the Oaks, have also their astringent properties. In our common Chestnut[10] (fig. 189–198), as well as in that of America, which has always been considered a different species, and named *Castanea pumila*,[11] the liber has been employed as an anti-dysenteric; the involucre of the fruit as a dye: the bark is used to tan skins and make ink. The wood of the Chestnuts is one of the most useful known; they are valuable trees which grow in the poorest silicious soils. The fruit[1] is well known to be edible, and is used for making many alimentary preparations.[2] The Beech is not less useful, particularly the common Beech[3] (fig. 199—204); the wood of which is used for a multitude of purposes, and its bark and fruit are valued for tanning and dyeing. The charcoal and soot extracted from it are used for making powder, and an esteemed bistre colour. The fruit serves to make a sort of bread, and the embryo is rich in oil, useful both for the table and for lighting. In America, *Fagus ferruginea*[4] is applied to the same uses, industrial and economic. In Chili, *F. obliqua*,[5] according to travellers, furnishes a wood almost as valuable as that of the Oak. The Alders and Birches are also valuable trees, especially in Europe and North America. The common Alder[6] (fig. 165—167) has an astringent bark, employed in the treatment of fevers and angina. The leaves are considered poisonous; they were applied to tumours, and the property of arresting the secretion of milk has been attributed to them. In America, *Alnus serrulata*[7] is used in the treatment of cutaneous, scrofulous, and syphilitic affections. Many other Alders[8] have analogous properties. The most useful of the Birches is the White Birch[9] (fig. 151—157), a tree of the cold and temperate regions of our hemisphere. Its sap, extracted in spring, is sweet and acidulous. It has been prescribed for many maladies[1]—gout, rheumatism, skin diseases. Sugar and vinegar are extracted from it; a sort of sparkling wine may also be prepared from it, considered, as also the sap itself, as a diuretic and purifier, an antiscorbutic and antipsoric, a vermifuge and lithontriptic. The bark and leaves have been prescribed for scrofulous swellings, tumours, pains, dropsies. The bark has been extolled as antipsoric, antiscorbutic, and febrifuge. It furnishes by distillation a pyrogenous oil, having the odour of fine Russia leather, and is said to be used in preparing it. The same is said of the bark and leaves of *Myrica*, notably of those of *M. Gale.* The Black Birch[2] and Dwarf Birch[3] have the same properties;[4] from the sap a kind of fermented beer is prepared. Nearly all the species of the genus have a flexible bark, easily detached, and used for making certain useful objects.[5] The Hazels are prized for their wood, their febrifuge and tonic bark, tinctorial leaves, and especially for their alimentary seed, from which an edible oil is extracted. In Europe it is chiefly the common nut[6] (fig. 168—173), or filbert, with its numerous varieties and cultivated forms,[7] and *Corylus tubulosa*[8] and *Colurna*;[9] in the United States, *C. americana*[10] and *C. rostrata*;[11] found also in the north of eastern Asia.[12] They have the same properties and the same alimentary embryo. The Hornbeams, or Yoke Elms, have a very useful wood, and a bark used for dyeing in some parts of Europe. The common Hornbeam[13] (fig. 175—180) forms the hedges of our parks. *Carpinus*

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[1] Especially mentioned are the galls produced by *Q. Cerris* L. *humilis* Lamk. *Ægilops* L. *tauricola* Kotsch. *Vallonia* Kotsch. *Q. Ægilops* and *coccifera* furnish also a sweet substance called Oak manna.

[2] *Q. coccinea* Wangenh. *Anpfl. Nordam. Holz.* (1777), 44, fig. 9.—Michx. *Chên.* t. 31, 32.—Michx. f. *Arbr. Amér.* ii. 116, t. 23.—A. DC. *Prodr.* n. 119.—*Q. rubra* L. *Spec.* 1413.—*Q. tinctoria* Michx. *Chên.* t. 24, 25.—Michx. f. *loc. cit.* t. 22.—Hayne, *Arzn. Gew.* 12, t. 46.—*Q. velutina* Lamk. *Dict.* ii. 721.—*Q. discolor* W. *Spec.* iv. 444?

[3] *Q. rubra* L. *Spec.* 1413 (part.).—Wangenh. *loc. cit.* t. 7.—Michx. *op. cit.* t. 35, 36.—A. DC. *Prodr.* n. 116.

[4] *Q. alba* L. *Spec.* 1414.—Michx. *op. cit.* ii. 13. t. 1.—Emers. *Tr. Massàch.* 127, t. 1.—A. DC. *Prodr.* n. 26.

[5] *Q. cinerea* Michx. *Chén.* t. 14.—A. DC. *Prodr.* n. 145.

[6] *Q. bicolor* W. *Nov. Act. Berol.* iii. 396, *Spec.* iv. 440.—Emers. *op. cit.* 135, t. 4.—A. DC. *Prodr.* n. 23.—*Q. Michauxii* Nutt. *Gen. Amer.* ii. 215.

[7] *Q. Cerris* L. *Spec.* 1415.—Hayne, *Arzn. Gew.* xii. t. 48.—Gren. et Godr. *Fl. de Fr.* iii. 118.—A. DC. *Prodr.* n. 79 (*Doucier, Gland châtin*).

[8] *Q. Ægilops* L. *Spec.* 1414 (not Scop.).—Tchihatch. *As. Min.* t. 41.—*Q. Valani* Oliv. (*Velanède, Velanida, Avelanède.*)

[9] For example *Q. montana* W. (*Prinos monticola* Michx.), *oliviformis* Michx. *lyrata* Walt. *Prinus* L. *Esculus* L. *Castanea* W. *falcata* Michx. *virens* Ait. *macrocarpa* Michx. *lobata* Nee, *falcata* Michx. *Catesbæi* Michx. *palustris* Du Roi, *aquatica* Walt. and other interesting species from North America, the greater part introduced to European culture, where they excite to a high degree the interest of botanists; in the old world, *Q. Farnetto* Ten. *humilis* Lamk. *alnifolia* Poech, *macrolepis* Kotsch. *Q. pseudosuber* Sant. (*Q. castaneæfolia* Coss.), which is also said to yield cork, *Q. Libani* Oliv. *castaneæfolia* C. A. Mey. *incana* Roxb. &c. (See Kotsch. *Eich. Eur. und Or.* 1858–62.—Rosenth. *op. cit.* 184–188.)

[10] *C. vulgaris* Lamk. *Dict.* i. 708 (1783).—A. DC. *Prodr.* 114.—*C. sativa* Mill. *Dict.*—*C. vesca* Gærtn. *Fruct.* t. 3.—Reichb. *Ic. Fl. Germ.* t. 640.—Turp. *Dict. Sc. Nat.* Atl. t. 304, 305.—Mér. et Del. *Dict. Mat. Méd.* ii. 133.—Guib. *op. cit.* ii. 284. — Rosenth. *op. cit.* 188 — *C. japonica* Bl.—*C. Bungeana* Bl.—*C. vesca americana* Michx. *Arbr.* ii. 56, t. 6.—*C. americana* Rafin. *N. Sylv.* 82.—*Fagus Castanea* L. *Spec.* 416.—Thunb. *Fl. Jap.* 195.

[11] Mill. *Dict.* n. 2.—Wangenh. *Nordam. Holz.* t. 47.—Michx. *Arbr.* ii. 166, t. 7.—*C. alnifolia* Nutt.—*C. nana* Muehlb. *Cat.* 86.—Ell. *Sketch,* ii 614.—*Fagus pumila* L. *Spec.* 1416 (*Chincapin*).

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[1] *Corives, Gagnaudes, Marrons de Lyon.*

[2] In Java, India, and other countries, many species (referred to the genus *Castanopsis*) have edible seeds, notably *C. javanica* Bl. *Tungurrut* Bl. *argentea* Bl. *indica* Roxb. In California the small fruit of *C. chrysophylla* Hook. (*Bot. Mag.* t. 4953) is said to be eaten.

[3] *Fagus sylvatica* L. *Spec.* 1416 (part).—Schkuhr, *Handb.* t. 303.—Duham. *Arbr.* ed. 2, 80, t. 24.—Reichb. *Ic. Fl. Germ.* t. 639.—Hart. *Forstl.* t. 20, 25, fig. 56, 103.—Mér. et Del. *Dict. Mat. Méd.* iii. 210.—Guib. *Drog. Simpl.* ed. 6, ii. 283.—A. DC. *Prodr.* xvi. sect. ii. 118. Gren. et Godr. *Fl. de Fr.* iii. 115.—Rosenth. *op. cit.* 188 (*Fayard, Fayau, Fau, Fan, Faou, Fouteau, Favinier*).

[4] Ait. *Hort. Kew.* iii. 362.—A. DC. *Prodr.* 118, n. 1.—*F. sylvestris* Michx. *Arbr. Am.* ii. 170, t. 8.—*F. sylvatica americana* Loud. *Encycl.* fig. 1695.—*F. Alba* Rafin.—*F. nigra* Rafin.

[5] Mirb. *Mém. Mus.* xiv. 465, t. 23.—C. Gay, *Fl. Chil.* v. 388 (*Roble, Pellin, Coyan, Huallé*). In the same country the wood of *F. Dombeyi* Mirb. (*Coyhue, Coigne*), is said to be used, of the bark of which boats are made, and in Australia the wood of *F. Cunninghami* Hook. (*Myrtle Tree*).

[6] *Alnus glutinosa* W. *Spec.* iv. 334.—Gærtn. *Fruct.* ii. t. 90.—Gren. et Godr. *Fl. de Fr.* iii. 149.—Reg. *Prodr.* xvi. sect. ii. 186.—Guib. *op. cit.* ii. 282.—Rosenth. *op. cit.* 182, 1105.—H. Bn. *Dict. Encycl. Sc. Méd.* vii. 254.—*A. barbata* C. A. Mey. *Enum. Pl. Caucas.* 43.—*A. oblongata* W.—*A. elliptica* Reg.—*A. nitens* C. Koch.—*A. Morisiana* Bert. — *A. suaveolens* Bert. — *A. denticulata* C. A. Mey.—*Betula Alnus glutinosa* L. *Spec.* 1394 (*Bergue, Vergne, Verne*).

[7] W. *Spec.* iv. 336.—Michx. *Arbr.* iii. 321, t. 4, fig. 1.—A. DC. *Prodr.* n. 13.

[8] *A. incana* W. is astringent, tinctorial.—*A. cordifolia* Ten. (fig. 158–164), *rubra* Bong. *incana* W. *jorullensis* K. have the same properties as our common Elder.

[9] *Betula alba* L. *Spec.* ii. 1393.—Gren. et Godr. *Fl. de Fr.* iii. 147.—Reg. *Prodr.* 162, n. 1.—H. Bn. *Dict. Encycl. Sc. Méd.* x. 314.

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[1] "Birch water is the hope, the happiness, and the panacea of rich and poor, great and small, lords and serfs."—(Percy).

[2] *B. nigra* W. *Spec.* iv. 464.—Reg. *Monogr. Betul.* 60, t. 12; *Prodr.* n. 16.—*B. rubra* Michx. *Arbr.* ii. 143, t. 3.

[3] *B. nana* L. *Spec.* 1394; *Fl. Lapp.* 266, t. 6, fig. 4.—Reg. *Prodr.* n. 7.

[4] Likewise *B. carpinifolia, populifolia, papyracea* Ait. *Bhojpaltra* Wall.

[5] On the bark of *Betula*, see Békétoff, *Bull. Mosc.* xiii. 75.

[6] *Corylus Avellana* L. *Spec.* 1417.—Schkuhr, *Handb.* t. 305.—Dietr. *Fl. Bor.* t. 842.—Reichb. *Ic. Fl. Germ.* t. 636. — Guib. *Drog. Simpl.* ed. 6, ii. 283.—Rosenth. *op. cit.* 184, 1105.—C. DC. *Prodr.* 130, n. 3.

[7] Notably the Hazel with large fruit (*C. Avellana Macrocarpa* Reichb. *Ic.* t. 638), or N. of Piedmont, of Barcelona; the red and white filberts, the striated Corford nut, &c.

[8] W. *Spec.* iv. 470.—Dochm. *Obstk.* iv. 38.—A. DC. *Prodr.* 132, n. 5.

[9] L. *Spec.* 1417 (part).—Dochm. *op. cit.* iv. 52 —A. DC. *Prodr.* n. 4.—*C. bizantina* Clus. *Hist.* 11.—*Avellana byzantina* J. Bauh. (*N. of Constantinople*).

[10] Walt. *Fl. Carol.* 236.—*C. humilis* W. *Baumz.* 108.—*C. americana humilis* Wangenh. *Arb.* 88, t. 29, fig. 63.

[11] Ait. *Hort. Kew.* iii. 364.—A. DC. *Prodr.* 133, n. 7.

[12] *C. mandschurica* Maxin. exs.

[13] *Carpinus Betulus* L. *Spec.* 1416.—Duham. *Arbr.* (ed. 2), ii. t. 58.—Reichb. *Ic. Fl. Germ.* t. 632.—Hart. *Forst.* t. 21.—Gren. et Godr. *Fl. de Fr.* iii. 120.—A. DC. *Prodr.* 126, n. 1 (*Charme blanc, Charpre, Charpenne*). *C. caroliniana* Walt. has the same uses in America.

Ostrya[1] is more rarely cultivated for the same purpose, and its bark and wood are also useful; likewise *C. virginiana*,[2] utilized by American industry. The Wax trees derive their name from the peculiarity presented by their pericarp, of developing within its fleshy substance, and on its surface, a substance resembling the wax of the bee. *Myrica cerifera*[3] is the best known in this respect; but the same property exists also in *M. pensylvanica*[4] and *carolinensis*,[5] in *M. cordifolia*,[6] *quercifolia*,[7] species from the Cape, and *M. æthiopica*,[8] of Abyssinia. The fruit of these plants is generally subjected to boiling water, when the wax, liquefied by the heat, rises to the surface. The *Myricas* all have an astringent bark, especially *M. sapida*[9] in India, and our *M. Gale*[10] (fig. 217—223), a marshy species, with odorous leaves,[11] substituted for the hop in Sweden, and for tobacco in Norway. It yields a yellow dye. The fruit of *M. sapida* and of *M. esculenta*[12] is eaten in India and in the western isles of Africa. Many Wax trees are cultivated among us, as are also a great many species belonging to other genera of the family—Oaks, Beeches, Birches, Alders, Hornbeams, and Hazels—particularly those forms and varieties with fastigiate or recumbent stems, pendent branches, laciniate or coloured leaves, brown or purple.

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[1] See p. 229, note 1.

[2] See p. 229, note 2.

[3] L. *Spec.* 1453.—MICHX. *Fl. Bor.-Amer.* ii. 227.—BIGEL. *Med. Bot.* t. 43.—MÉR. et DEL. *Dict. Mat. Méd.* iv. 531.—C. DC. *Prodr.* xvi. sect. ii. 148, n. 5.

[4] LAMK.—DUHAM. *Arbr.* ed. 2, ii. 190, t. 55 (var. (?) of preceding species).

[5] W. *Spec.* iv. 746 (var. scarcely distinct from preceding species).

[6] L. *Spec.* 1453.—DUHAM. *Arbr.* ii. 193.—C. DC. *Prodr.* n. 2 *Buisson de cire*). The Hottentots are said to eat this wax as a sort of bread.

[7] Var. (?) of *M. cordifolia.* It gives a green candle wax.

[8] L. *Mantiss.* 298.—THUNB. *Fl. Cap.* 153.—C. DC. *Prodr.* n. 31.—*M. serrata* LAMK. *M. arguta* H. B. K. of Columbia is used for dyeing.

[9] WALL. *Tent. Fl. Nepal.* 59, t. 45.

[10] L. *Spec.* 1453. — DUHAM. *Arbr.* ed. 2, t. 57.—REICHB. *Ic. Fl. Germ.* t. 620.—MÉR. et DEL. *Dict. Mat. Méd.* iv. 531.—GUIB. *op. cit.* ii. 281.—GREN. et GODR. *Fl. de Fr.* iii. 151.—C. DC. *Prodr.* 147.

[11] They are said to be used, with the bark of several Alders and Birches, in the preparation of Russia leather (p. 255).

[12] *M. Faya* AIT. (*Faya fragifera* WEBB) has large fleshy fruit, eaten in the Canary and Madeira isles.

GENERA.

I. BETULEÆ.

1. **Betula** T.—Flowers amentaceous monœcious apetalous; calyx 4-phyllous; folioles connate at base, very unequal; one more largely developed; the others smaller squamiform, very small or abortive. Stamens 2 (or 4?), central; filaments (anterior and posterior) 2-fid above; cells of each anther hence widely separate, extrorsely longitudinally rimose. Female flower naked; gynæcium free. Germen compressed, 2-locular; style nearly 2-partite at base; branches elongate filiform, stigmatose above. Ovules in cells 1 (very rarely 2), descending anatropous; micropyle extrorsely superior. Fruit dry, indehiscent, angular or samaroidly alate at margin, crowned with style, generally by abortion 1-spermous. Seed descending; coat thin; cotyledons of exalbuminous embryo, flat, rather fleshy, at germination foliaceous; radicle superior.—Trees or shrubs; leaves alternate, penninerved; stipules lateral, oftener caducous; male catkins solitary or 2-nate, from aphyllous lateral and terminal buds, generally precocious; scales of catkin peltate, with internal squamule on each side, 3-florous; female catkins from lateral 3–5-phyllous buds, solitary or more rarely racemose on common peduncle; scales of catkin subentire or oftener (from adnate lateral scales) 3-lobed, imbricate, 2–3-florous, finally oftener deciduous with fruit; cone oblong or ovoid. (*Temp. and cold regions of both worlds in North. hemisphere.*)—See p. 220.

2. **Alnus** T.—Flowers monœcious (nearly of *Betula*); male calyx oftener subequally or unequally 4-partite, more rarely 10–12-phyllous. Stamens equal in number and opposite sepals; anthers 2-locular.

Gynæcium, ovules, &c., of *Betula*. Fruit dry, compressed, wingless, or surrounded by a membranous wing, indehiscent; seed generally 1 (of *Betula*).—Trees or shrubs; leaves alternate; vernal floration preceding or simultaneous (*Phyllothyrsus*, *Clethropsis*) with leaves; scales of male catkins peltate, 5-bracteolate, 1- or oftener 3-florous; scales of female catkins cuneiform, shortly (from adnate bracteoles) 4–5-lobed, incrassate above, at maturity separating from each other, not deciduous, lignescent; cones short. (*Temp. and frigid regions of both worlds, temp. South America, South Africa.*)—See p. 223.

II. CORYLEÆ.

3. **Corylus** T.—Flowers amentaceous monœcious; males naked; stamens 4-8 (very rarely 2, 3), inserted within scales of catkin; filaments short free; anthers 1-locular (or 2-locular; cells separate), extrorsely rimose. Female flowers 2-nate budlike in axils of bracts of catkins; receptacle saclike, enclosing inferior adnate germen, with very short annular epigynous calyx; style branches 2, linear elongate, densely stigmatose papillose. Ovules in cells 2 solitary (or more rarely 2-nate) descending; micropyle extrorsely superior. Nuts more or less ligneous, 1-locular; walls very thick medullose below. Seed generally by abortion 1; cotyledons of thick exalbuminous embryo fleshy plano-convex, epigeous at germination; radicle short superior and united to base of cotyledons.—Small trees or shrubs; leaves alternate dentate or penninerved, in vernation longitudinally plicate as to the central nerve, and hence on one side facing axis; stipules caducous; catkins precocious; bracts of males cuneiform, generally covering 2 bracteoles, connate within (sometimes 0); female catkins short subsessile, finally stipitate to elongate foliate ramule; each fruit surrounded by a sacciform accrescent bracteole at sometimes open tubular apex dentate, laciniate or spinescent, very rarely (*Ostryopsis*) with external accrescent scale, divided within. (*Northern temperate regions of both hemispheres*). —See p. 225.

4. **Carpinus** T.—Flowers nearly of *Corylus;* the males consisting of stamens ∞ (3–20) inserted in axil of bracts of catkin; filaments slender 2-fid; anther cells separate, pilose at apex and extrorsely

rimose. Female flowers 2-nate in axils of caducous bracts of catkin; gynæcium, &c., of *Corylus*. Nucules crowned with remains of calyx subligneous plurinerved, 1-locular; seed of *Corylus*.—Small trees or shrubs; leaves alternate penninerved dentate, in vernation concave towards axis, not longitudinally plicate along costa; stipules lateral, oftener caducous; catkins precocious lateral; males slender; females elongate, ramiform terminal; bracteoles lateral accrescent around axillary fruit, or leaflike lobate patulous or internally increased at base by very small ligule (*Distegocarpus*), or more rarely conical-tubular (*Ostrya*), after anthesis developed to a nearly closed cone covered with stinging hairs and surrounding fruit. (*North. hemisphere of both worlds*).—See p. 227.

III. QUERCINEÆ.

5. **Quercus** T.—Flowers monœcious or rarely diœcious apetalous; male calyx 3–8-partite or lobate. Stamens same in number or 2–3-times as many; filaments slender exserted, or central, or more rarely inserted around rudiment of gynæcium; anthers extrorse, 2-locular, 2-rimose. Receptacle of female flower very concave, enclosing adnate germen and bearing superior 3–8-lobed epigynous calyx inserted at margin; germen cells 2–4, oftener 3, complete or generally incomplete above; style branches equal to number of cells, linear erect or oftener thick open, stigmatose above. Ovules in cells 2-nate, descending; more or less completely anatropous; micropyle extrorsely superior. Achene (acorn) surrounded at base with cupule, marked at apex with scar of thin perianth. Fertile seed 1, surrounded at base or at a greater or less height by 5 abortive seeds; cotyledons of exalbuminous embryo plano-convex fleshy, externally smooth or undulate, more rarely sinuate lobate; radicle superior.—Trees large or small; leaves alternate, sometimes persistent, penninerved, longitudinally plicate in vernation; stipules lateral fugacious; buds squamose stipulate; catkins erect or pendulous, 1-sexual, or more rarely androgynous; female flowers inferior; bracts alternate short, 1–3-florous; female catkins 1- or oftener few-florous; each flower and fruit surrounded by cupule externally squamose, spirally or annularly zonate, rarely sub-nude, sometimes finally fissous, free from acorn or adnate to base, exserted or more rarely enclosed. (*North. temp. regions of both worlds*).—See p. 230.

6? **Castanea** T.—Flowers monœcious (nearly of *Quercus*); male calyx oftener 6-partite; folioles 2-seriate. Stamens 6–20, often 2-seriate; filaments erect exserted; anthers extrorse; cells short subglobose rimose. Female flowers within involucre 1–3; receptacle lageniform, enclosing adnate germen; cells 3 (*Castanopsis*) or 4–6, more or less complete; style branches same in number simple, surrounded at base by lobes of superior calyx generally same in number. Ovules in each cell 2 descending and other characters of *Quercus*. Fruit dry, 1–3 enclosed in subglobose involucre, externally cristate or echinate with sharp scales various in form or sub-conical tubercles, finally closed or 2–4-partite. Seed in each 1, descending; cotyledons of exalbuminous embryo fleshy farinaceous, plano-convex or externally undulately ruminate; radicle superior.—Trees; leaves alternate, entire or dentate penninerved; stipules lateral fugacious; male catkins springing from axils oftener inferior, slender caducous; androgynous or female from upper or terminal axils; other characters of *Quercus*. (*Temp. and cold regions of both worlds*).—See p. 233.

7. **Fagus** T.—Flowers monœcious; males solitary or sub-capitate. Calyx gamophyllous sub-campanulate, 4–8-lobed. Stamens equal in number to lobes of calyx, or twice as many; filaments inserted at bottom of calyx, slender exserted; anthers oblong extrorse, 2-rimose; connective obtuse or mucronate at apex. Female flowers within involucre 1–3; receptacle very concave lageniform 3-gonal; cells 3, 2-ovulate; style branches 3, short or elongate, glabrous or pilose at back, surrounded at base with 6 lobes of epigynous calyx. Ovules in cells 2, collaterally descending; micropyle extrorsely superior. Fruit enclosed in common accrescent woody involucre, 4-partite and bracteate at base, clothed externally with scales or fimbriate prickles, dry indehiscent, alately 3-gonal. Fertile seed 1, descending, accompanied above by 3–5 very small sterile seeds; cotyledons of exalbuminous embryo fleshy rather thick, entire or adpressed plicate, in germination epigeous, expanded, foliaceous; radicle short superior.—Trees or shrubs; leaves alternate penninerved, in vernation convex plicate along nerves or non-plicate (*Nothofagus*), persistent or deciduous; stipules lateral fugacious; male flowers springing from axils of inferior leaves; females from those of superior sessile stipitate. (*Temp. regions of both worlds*).—See p. 237.

IV? BALANOPSEÆ.

8. **Balanops** H. Bn.—Flowers diœcious; males naked, consisting of stamens ∞ (generally 3–10), subumbellate on very small convex receptacle; filaments short erect, sometimes connate at base; anthers introrse, 2-rimose. Female flowers solitary; receptacle short, sometimes subcupular; folioles of perianth (?) ∞, thick unequal, greater from exterior to interior, imbricate. Germen free, suddenly attenuate from base, narrowing at apex to 2-partite style; branches linear-subulate papillose, 2-fid; cells of germen 2, very incomplete. Ovules in each 2-nate, inserted on placentiform dissepiment, ascending; micropyle extrorsely superior; funicles slender unequal erect, dilated at apex to obturator covering micropyle. Fruit surrounded at base by persistent and cupuliform calyx (?), ovoid accuminate subbacate; mesocarp more or less pulpy; endocarp finally subcompletely septate. Seeds in cells solitary suberect; coat glabrous; cotyledons of slightly albuminous straight embryo ovate, foliaceous or rather thick; radicle short inferior.—Trees or shrubs; leaves alternate or spuriously verticillate, coriaceous, penninerved exstipulate; male catkins solitary or few fasciculate springing from wood of branches, breaking from perulate bud, slender and loaded with remotely alternate 1 bracteolate flowers; female flowers often crowded sessile on wood. (*N. Caledonia*).—See p. 240.

V? LEITNERIA.

9. **Leitneria** Chapm.—Flowers diœcious amentaceous; males consisting of stamens 5–10, inserted in axil of scales of catkin and more or less connate with its base; filaments free; anthers introrse, 2-rimose. Female flowers in axil of bracts solitary, either naked, or surrounded by a minute unequally 3–4-lobed calyx, laterally bracteolate (and sometimes increased by a few stamens); germen free, 1-locular, attenuate to elongate recurved style stigmatose and and sulcate within. Ovule 1, inserted in internal angle descending, incompletely anatropous; micropyle extrorsely superior. Fruit oblong drupaceous; flesh scanty; putamen 1-spermous. Seed descending; cotyledons of slightly albuminous embryo rather flat and fleshy; radicle superior. — A small tree; leaves alternate

petiolate penninerved; stipules lateral; catkins axillary; floration developed before leaves. (*Florida.*)—See p. 242.

10 (?). **Didymeles** Dup.-Th.—Flowers diœcious amentaceous; surrounded by bracteoles or sepals (?); males 2-androus; filaments short erect; anthers ovate extrorse, 2-rimose. Carpels 2, opposite free; germen of each 1-locular, attenuate above to long recurved and revolute style, longitudinally sulcate and densely plumose-papillose within. Ovule 1, descending; micropyle extrorsely superior; exostome far produced in tube dilated at apex. Fruit consisting of drupes (?) 2, sulcate within; seed descending; cotyledons of exalbuminous embryo thick fleshy plano-convex; radicle superior.—A tree (?); leaves alternate petiolate entire penninerved coriaceous; catkins axillary and (?) terminal. (*Madagascar.*)—See p. 244.

VI (?) MYRICEÆ.

11. **Myrica** L.—Flowers diœcious or more rarely monœcious amentaceous; males consisting of stamens 2–20, sessile in axil of each bract or spicate, naked or surrounded by 2-∞ bracteoles; filaments free or connate at base; anthers extrorse, 2-rimose. Female flowers sessile in axils of scales of catkin, naked at base or surrounded by 2 or a few sterile or rarely fertile bracteoles (bearing abortive budlike flower in axil). Germen free, 1-locular; style branches 2 (anterior and posterior), papillose-plumose within; ovule 1, basilar or subbasilar orthotropous; micropyle superior. Fruit drupaceous; exocarp rugose papillose and secreting a waxy matter; putamen more or less hard, 1-spermous. Seed erect; cotyledons of straight exalbuminous or very scantily albuminous embryo thick; radicle superior.—Small trees, shrubs or undershrubs, often odorous; leaves alternate, very rarely (*Comptonia*) stipulate, penninerved, entire or dentate or serrate; catkins axillary generally springing from innovation, simple or compound, either 1-sexual, or androgynous; female flowers superior; males inferior. (*All temp. and warm regions.*)—See p. 244.

LII. COMBRETACEÆ.

I. COMBRETUM SERIES.

The flowers of *Combreta*[1] (fig. 226–228) are hermaphrodite or polygamo-diœcious. In certain species they are pentamerous, notably in those of which the genera *Poivrea*[2] and *Cacoucia*[3] have been made. The receptacle has the form of a very deep sac, narrow and elongate,[4] insensibly attenuated towards the upper part and there

Combretum (Poivrea) coccineum.

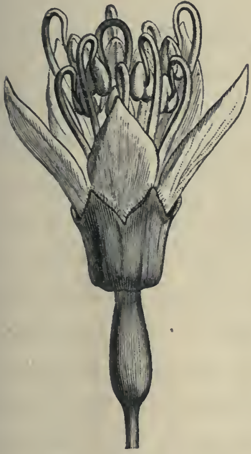

Fig. 226. Flower ($\frac{5}{1}$).

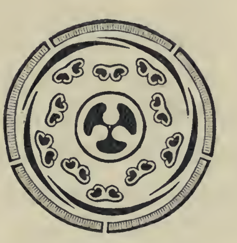

Fig. 227. Diagram.

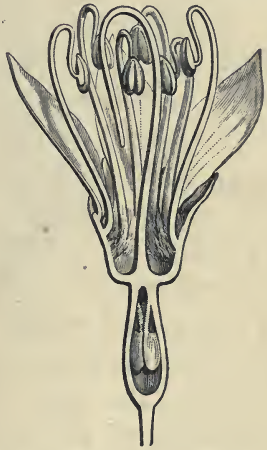

Fig. 228. Long. sect. of flower.

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[1] *Combretum* Lœfl. *Ic.* 308.—L. *Gen.* n. 475.—Gærtn. *Fruct.* i. 176, t. 36.—Lamk. *Dict.* i. 734; Suppl. ii. 229; *Ill.* t. 282.—DC. *Prodr.* iii. 18; *Mém. Combret.* t. 5.—Turp. *Dict. Sc. Nat.* Atl. t. 221.—Spach, *Suit. à Buffon*, iv. 308.—Endl. *Gen.* n. 6087.—Payer, *Fam. Nat.* 96.—Hook. *Fl. Ind.* ii. 452.—*Aetia* Adans. *Fam. des Pl.* ii. 84.—*Forsgardia* Velloz. *Fl. Flum.* 152; iv. t. 13.—*Chrysostachys* Pohl, *Pl. Bras.* ii. 65, t. 143.—*Embryogonia* Bl. *Mus. Lugd.-Bat.* ii. 122.—*Sheadendron* Bertol. *Ill. Plant. Mozamb. Mém. Acad. Bologn.* (1850) 12, t. 4.—Kl. *Pet. Moss. Bot.* 74, t. 14.—Car. *Journ. Linn. Soc.* iv. 167.—*Calopyxis* Tul. *Ann. Sc. Nat.* sér. 4, vi. 86.—*Bureava* H. Bn. *Adansonia*, i. 71 (ex M. Arg. DC. *Prodr.* xv. p. ii. 1258.—*Argyrodendron* Kl. (*Pet. Moss. Bot.* 101) is, according to Mueller d'Argovie (DC. *Prodr.* xv. p. ii. 700), by one of its species (*A. Petersii*, Kl.) syn. with *Combretum*.

[2] Commers. ex Dup.-Th. *Obs. Plant. Afr. Austr.* 28.—DC. *Mém.* t. 4; *Prodr.* iii. 17.—*Pevræa* Commers. ex J. *Gen.* 230.—*Gonocarpus* Ham. *Prodr. Fl. Ind. Occ.* 39.

[3] Aubl. *Guian.* i. 450.—J. *Gen.* 300.—Lamk. *Ill.* t. 359.—DC. *Prodr.* iii. 22 (part).—Spach, *loc. cit.* 315.—Endl. *Gen.* n. 6088.—B. H. *Gen.* 688.—*Hambergera* Scop. *Introd.* n. 276.—*Hambergia* Neck. *Elem.* n. 830.—*Schousbæa* W. *Spec.* 578 (not Schum. et Thönn.).

[4] Often with 4–6 salient angles.

abruptly dilated to a kind of hemispherical cup, lined to a variable extent by a glandular bed or numerous hairs, the margin of which bears the sepals, valvate at adult age.[1] In the intervals are inserted an equal number of petals very variable in size, sometimes large and contorted or more rarely imbricate, in other cases very narrow; sometimes they are entirely wanting.[2] The stamens are in number double that of the petals and are arranged in two verticils. Five are superposed to the petals and inserted on the internal surface of the receptacle higher than the alternate ones. All have a free subulate elongate exserted filament, at first folded back upon itself so that its summit is directed downwards to attach itself to the back of the anther which is introrse, bilocular, dehiscing by two longitudinal clefts. It becomes erect at the time of anthesis.[3] In the female or hermaphrodite flowers, the receptacular cavity, below the point where it is dilated to a cup, is entirely filled by the adnate ovary which is surmounted by a subulate style, at summit stigmatiferous, not swollen, undivided. In the single cavity of the ovary are found two or three parietal placentæ, often but slightly distinct at adult age, from the upper of each of which depend one or two ovules, at first lateral,[4] attached by a funicle more or less long and slender, anatropous and with micropyle directed upwards and outwards.[5] The fruit, surmounted by a scar produced by the early separation of the dilated portion of the receptacle, is elongate, coriaceous, membranous or almost spongy, generally indehiscent,[6] with four to six vertical prominences in form of dihedral angles, soft or pointed, sometimes dilated to vertical wings, coriaceous or membranous. The narrow central cavity of the pericarp contains a single descending seed, narrow and elongate, often traversed by longitudinal furrows, enclosing under its coats a fleshy embryo, destitute of albumen, with superior radicle, and cotyledons plano-convex, angular or plicate, contortuplicate, more rarely convolute. In *Cacoucia*,[7] the receptacular tube is often a little curved or gibbous on one side, and the stamens are more decidedly incurved in the bud. The andrœcium is diplostemonous or sometimes formed of a number of stamens a little above ten; a fact occasionally observed in the *Combreta* proper. On the other hand there is impoverishment of the andrœcium in *Thiloa*,[1] the apetalous and tetramerous flower of which sometimes has eight stamens; four of them may be wanting or remain sterile. All these plants, however, appear to us inseparable from the genus *Combretum*, which, thus constituted, comprises about a hundred and thirty species,[2] generally shrubby, not unfrequently sarmentose and climbing, with opposite leaves, rarely verticillate or

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[1] Often at first slightly imbricate.

[2] Especially in *Calopyxis* and *Thiloa*.

[3] In the *Combreteæ* the pollen is generally ovoid with three or six folds, and in water spherical with three or six bands, each bearing one or several papillæ (H. MOHL. *Ann. Sc. Nat.* sér. 2, iii. 332).

[4] Their point of attachment to the partition appears, in adult age, to be quite apicular, but this is only an illusion.

[5] Their coat is double.

[6] It opens tardily in four pannels in *Sheadendron* BERTOL., in five in some other African species.

[7] They have been distinguished as a genus chiefly on account of their fruit, which is

Quisqualis indica.

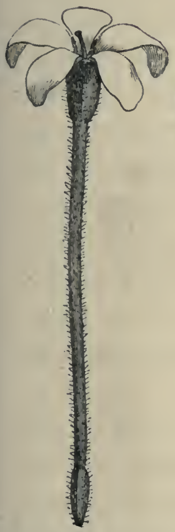

Fig. 230. Flower ($\frac{2}{1}$).

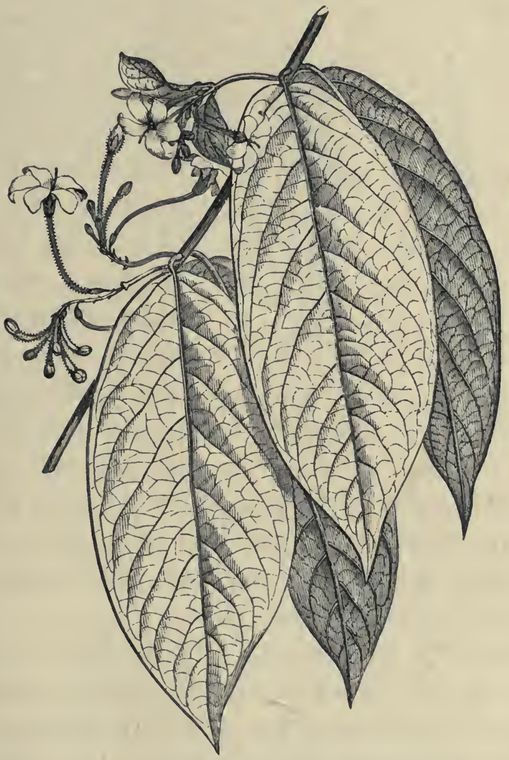

Fig. 229. Floriferous branch.

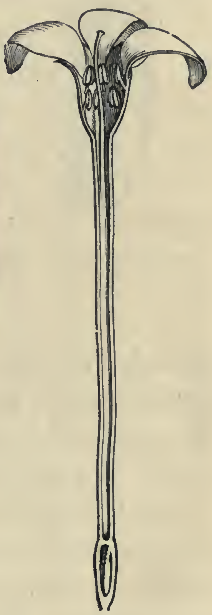

Fig. 231. Long. sect. of flower.

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described as fleshy. However, it is finally quite dry and 5-angular, like that of so many other *Combreteæ*, and it also presents incomplete lines of dehiscence.

[1] Eichl. *Regensb. Flora* (1866), n. 10; *Mart. Fl. Bras. Combret.* 103, t. 27.

[2] H. B. *Pl. Æquin.* t. 132; *Adans.* xi. 379.—H. B. K. *Nov. Gen. et Spec.* vii. 138.—A. S. H.

alternate, petiolate, entire; and flowers disposed in simple or more or less ramified spikes, very variable in form and length,[1] and furnished with bracts more or less developed. They belong to the warm regions of Asia, Africa, and South America.

Quisqualis (fig. 229–234), climbing shrubs of tropical Asia and Africa, have all the characters of the *Combreta*, except that the receptacular pouch, after enveloping the ovary, is prolonged upwards in a long tube traversed by the style adhering to one side of it; after which it is dilated to a cup which bears ten stamens with short filaments erect at adult age, and higher up five valvate sepals and five imbricate or contorted petals. The fruit is dry and encloses a single seed, the embryo of which has two fleshy cotyledons, round or channelled externally. The pretty flowers of *Quinqualis* are collected in short capituliform spikes more rarely in axillary and terminal clusters.

Quisqualis indica.

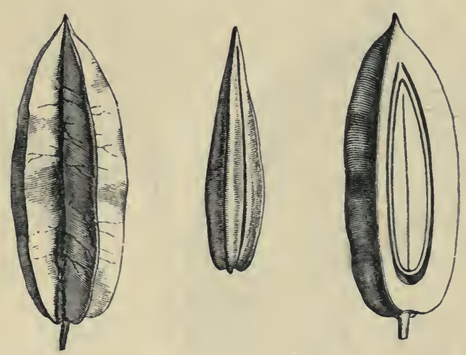

Fig. 232. Fruit. Fig. 234. Seed. Fig. 233. Long. sect. of fruit.

In *Lumnitzera*, trees and shrubs with alternate and coriaceous leaves, growing on the shores of all the tropical seas of the old world, the flowers are hermaphrodite and very analogous to those of *Combretum.* The long receptacle, enveloping the ovary, is dilated above the latter in a campanulate cup, the margin of which bears five slightly imbricate persistent sepals and five contorted or imbricate petals. Its interior surface is covered with a glandular disk with ten indentations in the upper part, at the bottom of which are inserted the stamens with filaments slightly incurved at the summit, and cordate introrse anthers. The ovules, of which the number varies from two to five, are suspended by a long funicle; and the

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Fl. Bras. Mcr. ii. 246, t. 129, 130.—HOOK. *Icon.* t. 592; *Bot. Mag.* t. 2944.—GUILLEM. et PERR. *Fl. Sen. Tent.* i. t. 66, fig. 1 (*Poivrea*), 67, 68.—BENTH. *Niger*, 337 (*Poivrea*).—HARV. *Thes. Cap.* t. 74, 75.—SOND. *Fl. Cap.* ii. 508, 512 (*Poivrea*).—TUL. *Ann. Sc. Nat.* sér. 4, vi. 76 (*Poivrea*), 83 (*Combretum*).—LAWS. *Fl. Trop. Afr.* ii. 419, 433 (*Cacoucia*).—EICHL. *Mart. Fl. Bras. Combret.* 106, 120 (*Cacoucia*), t. 27–32, 34.—*Bot. Reg.* t. 429, 1165, 1631.—WALP. *Rep.* ii. 65, 68 (*Cacoucia*); v. 662; *Ann.* i. 290; ii. 525; iv. 673.

[1] Those of *Cacoucia* are very long.

woody elongate fruit bearing at its margin the traces of the two lateral bracteoles of the flower, borne on the sides of the receptacle, contains one linear seed the embryo of which has convolute cotyledons. *Laguncularia racemosa*, a shrub inhabiting, like *Lumnitzera*, the brackish waters of the shore alike in western Africa and tropical America, has opposite leaves and spikes of polygamous flowers, the inferior and obconical ovary of which also bears upon its margin the lateral bracteoles raised nearly to the height of the persistent calyx, and five imbricate petals. The stamens are also to the number of ten with short filaments and cordate anthers, and are inserted at the level of an epigynous disk which crowns the ovary and surrounds the base of a short style stigmatiferous and bilobed at summit. In the ovarian cavity is found a placenta nearly apical from which depend two sessile ovules. The fruit, dry and coriaceous, obpyramidal and inwardly compressed, encloses a single seed the embryo of which has also convolute cotyledons. *Macropteranthes*, Australian shrubs, owe their name to the presence, on the sides of their ovary and fruit, of two large lateral bracteoles, raised and flattened inwardly, in the form of wings. The flower is in other respects that of *Laguncularia*, except that the receptacle contracts much less above the ovary, and that the latter contains from ten to sixteen ovules suspended by slender funicles of very unequal length. The leaves are opposite or fasciculate, and the flowers geminate on axillary peduncles.

Guiera and *Calycopteris*, shrubs with opposite and downy leaves, the one from tropical Africa, the other from India, have pentamerous flowers, in construction very near those of *Combretum*. In the former they are collected in a sort of capitule surrounded by four large foliaceous decussate bracts forming an involucre. In the latter they are disposed in large ramified clusters. But *Guiera* has long expanded petals inserted in the hollows of five sepals persistent but not accrescent to the summit of a long siliquiform curved very villose fruit; whilst *Calycopteris* has no petals, and its fruit, short and pentagonal, is surmounted by accrescent sepals in five membranous and veined plates. In both these genera the embryo has convolute cotyledons.

Terminalia has given its name to a distinct tribe of this family (*Terminalieæ*), the principal characters of which were thought to be, alternate leaves, apetalous flowers, and an embryo with convolute cotyledons. Besides *Terminalia* (fig. 235–240), it comprised many

Terminalia mauritiana.

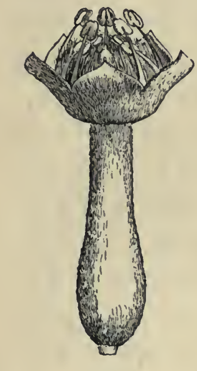

Fig. 236. Flower ($\frac{1}{4}$).

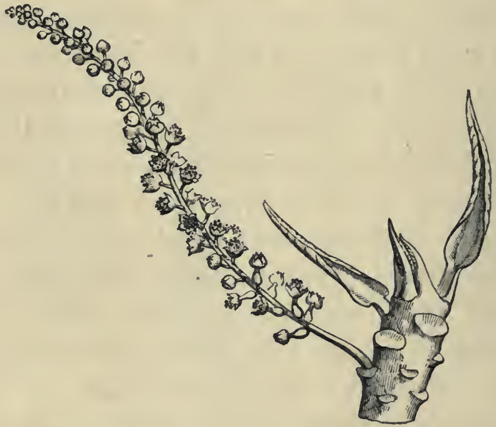

Fig. 235. Floriferous branch.

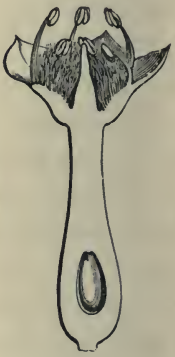

Fig. 237. Long. sect. of flower.

Terminalia (Anogeissus) leiocarpa.

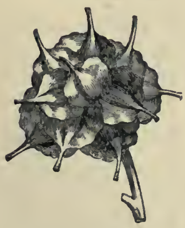

Fig. 238. Capitule of fruit.

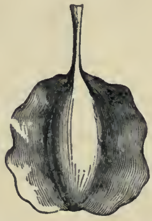

Fig. 239. Single fruit ($\frac{1}{3}$).

other genera, in particular *Anogeissus*, *Buchenavia*, *Bucida*, *Chuncoa*, *Conocarpus*, *Pentaptera*, *Ramatuella*, which we can separate from it only as sub-genera. *Terminalia* proper has hermaphrodite, polygamous or diœcious flowers, the narrow receptacle of which, after enveloping the ovary, immediately expands into a cup similar to that of *Combretum*, and bears four or five valvate sepals, two series of stamens inserted around the base of the style, ordinarily surrounded by a hairy epigynous disk annular or lobed. In the unilocular ovary are found two or three descending ovules similar to those of *Laguncularia*. The fruit, not, as usual, crowned with the caducous calyx, is very variable in appearance, consistence, and form. In *Badamia*, *Myrobalanus*, and *Pamœa*, it is ovoid, with a roundish or angular putamen. In *Catappa* and *Anogeissus*, it is compressed or dilated into two marginal wings (fig. 238, 239). In *Chuncoa*, species whose leaves are frequently opposite and furnished with two glands at the base of the inferior surface, it is small, coriaceous, and prolonged to 2–5 expanded membranous wings. In *Pentaptera*, the leaves of which have ordinarily the same characters, the putamen is osseous or woody, and the wings are 5–7 in number. *Ramatuella*, from

Venezuela, has a slightly fleshy fruit with three to six thick vertical wings, entire, sinuous, or lobed at the margin. Besides, their flowers are collected in capitules, that is, the principal axis remains the shortest as often happens in the true *Terminalia*, although the latter frequently have also flowers in elongate simple or compound spikes (fig. 235). The flowers of *Anogeissus* are also in capitules. This is why we have not retained, as distinct from *Terminalia*, *Conocarpus* (fig. 240), which has the same apetalous, pentamerous flowers as *Terminalia*, but the inflorescences of which become small globular capitules collected in clusters. In *Conocarpus*, the fruit is finally surrounded externally by persistent recurved bracts remaining close to each other so that the whole forms a sort of cone. Thus limited, this genus comprises nearly a hundred species, all tropical, common to the four quarters of the globe, principally in the old world.

Terminalia (*Conocarpus*) *erecta*.

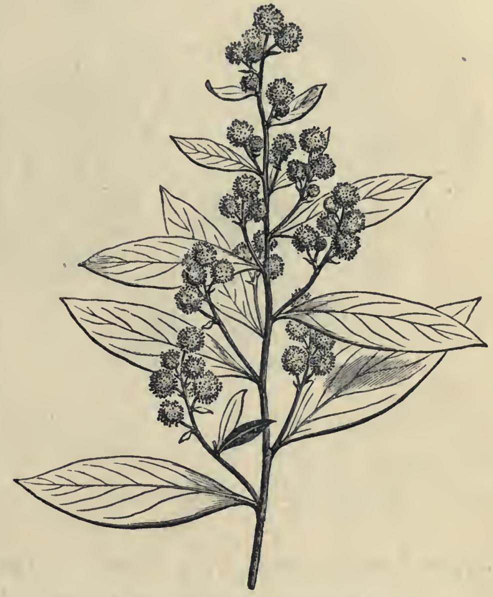

Fig. 240. Floriferous branch.

II. TUPELOS SERIES.

Tupelos[1] (fig. 241–244) has polygamo-diœcious flowers. In the male flower, the summit of the pedicel is dilated to a small calyx with five or more short teeth, surmounted by a thick orbicular glandular disk, with entire or crenulate margin, sometimes smooth and bare on the upper surface, and sometimes supporting a central and conical rudiment of a gynæcium. Outside of this are inserted caducous petals, equal in number and alternating with the teeth of the calyx, and an equal, double, triple or quadruple number of stamens, arranged in verticils and formed each of a free slender exserted filament, and a short, bilocular, introrse anther dehiscing by two longitudinal clefts. In the hermaphrodite flowers, the perianth and andrœcium are the same; but the receptacle is deeply depressed to an obconical or tubular cavity which encloses an inferior and unilocular ovary,[1] surmounted by a simple or rarely bifurcate, curved or revolute style, the internal margin of which is traversed by a longitudinal furrow with edges covered with stigmatic papillæ. In the female flowers the stamens disappear, or are carried, in small number and sterile, above the ovary, by the margin of the receptacle. In the internal angle of the ovarian cell near the summit is inserted a descending anatropous ovule, with micropyle exterior and superior.[2] The fruit is an oblong drupe, crowned by a scar, with thick and hard putamen, compressed or cylindrical, enclosing a seed the membranous coats of which cover a fleshy albumen, which envelopes an embryo with foliaceous cotyledons, nearly equal in size to the albumen and surmounted by a short cylindrical radicle. Tupelos consists of trees or shrubs, not unfrequently covered with a silky down, growing, to the number of half a dozen species,[3] in the southern part of North America, in the temperate mountainous regions of Asia, and in the

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[1] *Nyssa* Gronov. *Virg.* 162.—L. *Gen.* n. 1163. —J. *Gen.* 75.—Lamk. *Ill.* t. 851.—Poir. *Dict.* iv. 508; Suppl. iv. 115.—Gærtn, f. *Fruct.* iii. 201, t. 216.—Spach, *Suit. à Buffon*, x. 463.— Endl. *Gen.* n, 2086.—Lindl. *Veg. Kingd.* 720.—A. DC. *Prodr.* xiv. 622.—H. Bn. *Adansonia*, v. 196.—B. H. *Gen.* 952, n. 11.—*Tupelo* Catesb. (ex Adans. *Fam. des Pl.* ii. 80).—*Cynoxylon* Pluk. (ex Adans. *loc. cit.*)

Nyssa biflora.

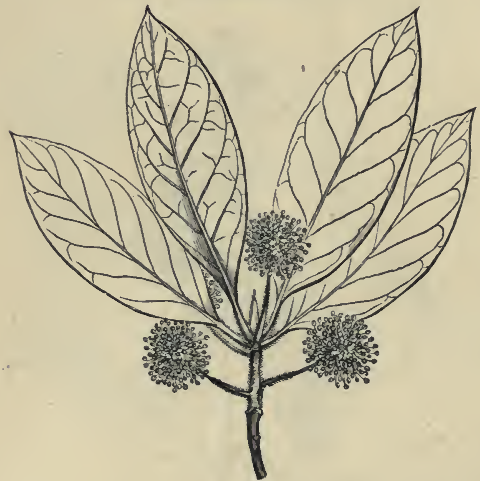

Fig. 241. Male floriferous branch.

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[1] Now and then flowers occur with two carpels and an ovary with two cells complete or incomplete and uniovulate.

[2] With double envelope.

[3] Michx. *Arbr. For.* t. 18-22.—A. Gray, *Man.* ed. 5, 201.—Chapm. *Fl. S. Unit. St.* 168. For the real number of species to be retained see p. 279, n. 6.

Malayan archipelago.[1] The leaves are entire, widely dentate or sublobate, alternate, petiolate, without stipules. The flowers, at the summit of a common peduncle, form a sort of capitule or short spike on which they are disposed in small groups (probably glomerules), accompanied by lateral bracteoles sometimes forming small involucres. The females, less numerous at the summit of the common peduncle, may even be solitary.[2]

Nyssa biflora.

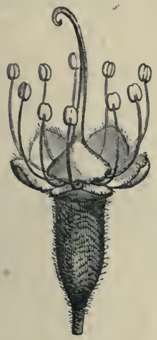

Fig. 243. Hermaphrodite flower ($\frac{3}{1}$).

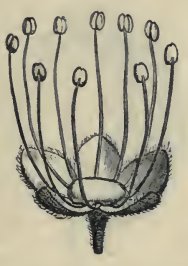

Fig. 242. Male flower ($\frac{4}{1}$).

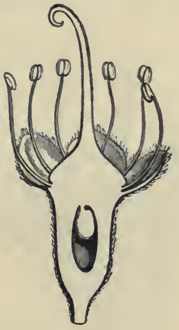

Fig. 244. Long. sect. of hermaphrodite flower.

III ? ALANGIUM SERIES.

The flowers of *Alangium*[3] (fig. 245–252) are regular and hermaphrodite. The concave receptacle, like that of *Combretum* or *Nyssa*, encloses an inferior ovary and is crowned with an epigynous disk, around which are inserted the calyx, the corolla, and the andrœcium. The calyx, short and superior, has from four to ten teeth with which alternate an equal number of narrow elongate valvate petals, finally reflexed or revolute. The epigynous stamens are the same in number as the petals, with which they alternate, or double, triple, or quadruple (fig. 245, 246); they are formed each of a free filament, glabrous or hairy, and a bilocular, introrse anther dehiscing by two longitudinal clefts.[1] The ovary, set in the cavity of the receptacle and consequently inferior, is unilocular in the true Alangiums, and encloses, inserted a little below the summit, a descending anatropous ovule with micropyle primarily superior and exterior, later lateral, afterwards slightly contorted.[2] The style, rising from the centre of the epigynous disk, is swollen at its stigmatiferous summit, almost entire or divided into a variable number of small lobes. The fruit is a drupe, crowned with the persistent calyx and the putamen, often of little thickness, encloses a seed whose coats cover a fleshy albumen, externally smooth or ruminated, enveloping an axile embryo, with superior cylindrical radicle, and wide foliaceous cotyledons, flat or more or less contortuplicate. There are some species of *Alangium*

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[1] According to Bentham and Hooker, *N. sessiliflora* Hook. f. and Thoms., a Himalayan species, is very analogous to *Ceratostachys* (Bl. *Bijdr.* 644 ;—Miq. *Fl. Ind.-Bat.* i. p. i. 839), a Javanese plant, itself probably identical with *Agathisanthes* (Bl. *loc. cit.* ;—Miq. *loc. cit.* 838). *Camptotheca*, of Tibet, appears very near the preceding types, differing chiefly in its valvate corolla (imbricate in *Ceratostachys*) and in its anthers with four cellules pendent from a dilatation of the connective, and opening irregularly on the side of the filament.

[2] Here also we provisionally place *Davidia*, a beautiful tree of Tibet, the authentic specimens of which, unfortunately, some time since disappeared from the herbarium of the Museum, which has prevented us from giving a figure of it. The flowers are collected in 1- or 2-sexual capitules ; the males represented simply by stamens, free on the surface of a globular receptacle. The female flower, occupying, when present, not the summit, but the side of the upper portion of the receptacle, is composed of an inferior ovary, with numerous uniovulate cells, surmounted by an epigynous calyx, within which may be found some short stamens with fertile or sterile anthers. The ovules in each cell are solitary and descending, with exterior micropyle. *D. involucrata* has alternate leaves and two large white foliaceous bracts under the inflorescence.

[3] Lamk. *Dict.* i. 174 ; Suppl. i. 366.—Correa, *Ann. Mus.* x. 161. — DC. *Prodr.* iii. 203. — Spach, *Suit. à Buffon*, xiii. 260.—Endl. *Gen.* n. 6096.—H. Bn. *Adansonia*, v. 193.—B. H. *Gen.* 949, n. 1.—*Angolam* Adans. *Fam. des Pl.* ii. 85. —*Angolamia* Scop. *Introd.* n. 280.

Alangium decapetalum.

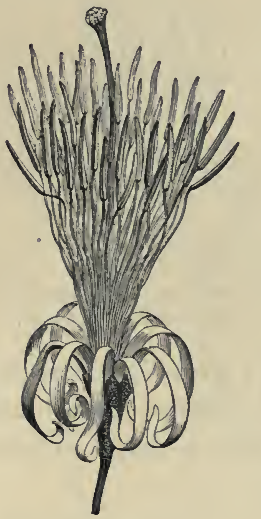

Fig. 245. Flower.

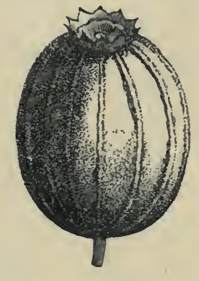

Fig. 247. Fruit.

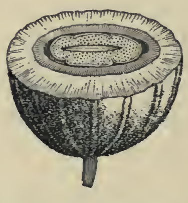

Fig. 248. Transverse sect. of fruit.

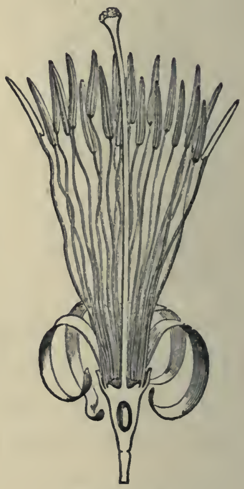

Fig. 246. Long. sect. of flower.

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[1] They are sometimes nearly marginal.

[2] It has a double envelope.

which, with a unilocular ovary, have a number of stamens double that of the petals; we have named them *Diplalangium*;[1] and others where, with an isostemonous andrœcium, there is likewise a single cell; these are our *Marleopsis*,[2] that is species which closely approach *Marlea*[3] (fig. 249–252), of which a distinct genus has hitherto been made, but of which we shall make only a section of the genus *Alangium*. The andrœcium is there constantly isostemonous, but the ovary cells are two in number. The consequence is that, in the drupaceous fruit, the putamen is hollowed with two cells. One of them is ordinarily narrow and sterile. The seed contained in the other has constantly albumen externally smooth and flat cotyledons. Thus conceived,[4] this genus comprises some fifteen species[5] inhabiting the tropical regions of Africa, Asia, and Oceania. They are trees

Alangium (Marlea) begoniæfolium.

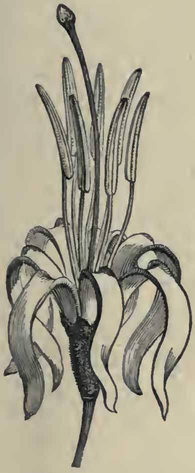

Fig. 249. Flower ($\frac{4}{1}$).

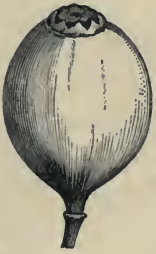

Fig. 251. Fruit.

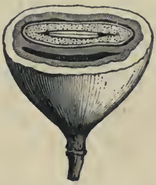

Fig. 252. Transverse sect. of fruit.

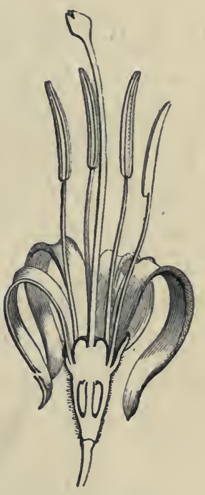

Fig. 250. Long. sect. of flower.

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[1] *Adansonia*, v. 195.

[2] It is often the same in *Rhytidandra* (A. Gray, *Unit. St. Expl. Exp. Bot.* i. 303, t. 28;—*Pseudalangium* F. Muell. *Fragm.* ii. 84).

[3] Roxb. *Pl. Coromand.* iii. 79, t. 283.—DC. *Prodr.* iv. 267 (note).—Endl. *Gen.* n. 6097.—H. Bn. *Payer Fam. Nat.* 341.—B. H. *Gen.* 949, n. 2.—*Stylidium* Lour. *Pl. Cochinch.* (ed. 1790), 220 (not Sw.).—*Stylis* Poir. *Dict.* Suppl. v. 260.—*Pautsauvia* J. *Dict. Sc. Nat.* li. 158.

[4] Alangium sect. 5.
1. *Angolam* (Adans.).
2. *Diplalangium* (H. Bn.).
3. *Marleopsis* (H. Bn.).
4. *Rhytidandra* (A. Gray).
5. *Marlea* (Roxb.).

[5] Wight and Arn. *Prodr.* i. 325.—Lindl. *Bot. Reg.* (1838), t. 61 (*Marlea*).—Wight, *Icon.* t. 194; *Ill.* t. 96.—Dcne. *Jacquem. Voy. Bot.* t. 83 (*Marlea*).—Miq. *Fl. Ind.-Bat.* i. pp. i. 773, 774

or shrubs sometimes spinous. Their leaves are alternate, petiolate, without stipules, regular or more or less unsymmetrical at the base, entire, dentate or lobed, penninerved or digitinerved at the base. The flowers[1] are disposed in cymes or glomerules more or less compound in the axil of the leaves, and each is ordinarily articulated at the summit of its pedicel.

This family was established by R. Brown[2] in 1810. Of the genera referred to it at the present time, some, such as *Nyssa*, *Conocarpus*, *Bucida*, *Terminalia*, *Chuncoa*, and *Pamea*, were attributed by A. L. de Jussieu to his Order *Elæagnaceæ*,[3] and others, such as *Cacoucia*, *Combretum*, and *Guiera*, to that of *Onagraceæ*.[4] *Alangium* figures at the head of the same author's following Order *Myrtaceæ*. Of the latter, De Candolle, in 1828, made a separate Order, *Alangieæ*,[5] which Lindley[6] retained, adding to it *Tupelos*, for which Jussieu[7] had, in 1825, founded a family, *Nyssaceæ*. Recently, *Nyssa* on the one hand and *Alangium* and *Marlea* on the other, have been ranged, by Bentham and Hooker,[8] in the family *Cornaceæ*, with which their affinities are incontestable.[9] At the same time, since in this family the ovules have the micropyle turned inwards, *Nyssa*, in which we have determined[10] it to be exterior, would not belong to it; and if, as we believe, its direction is at first the same in *Alangium*, and becomes lateral only by subsequent torsion, *Alangium* and *Nyssa* are not so near to *Cornus* as to the *Araliaceæ* and *Combretaceæ*. To the latter rather than to the former we provisionally refer them, on account of the characters of their andrœcium, of their inflorescence, of their style, and of their fruit. At one period, among the *Combretaceæ*, were known only plants with ovules inserted near the summit of the ovary. Later it was seen that their placenta was parietal and centripetal, and that the ovules were, in reality, inserted right and left of the upper portion of the placenta.

(*Marlea*); Suppl. i. 341.—Benth. *Fl. Hongk.* 138; *Fl. Austral.* iii. 386 (*Marlea*).—Tul. *Ann. Sc. Nat.* sér. 4, vi. 105.—H. Bn. *Adansonia*, x. 183 (*Marlea*).—Walp. *Ann.* i. 974 (*Marlea*); iv. 819 (*Rhytidandra*).

[1] Generally whitish.

[2] *Prodr. Fl. N.-Hol.* i. 351; *Flind. Voy.* ii. 548; *Misc. Works* (ed. Benn.), i. 19.

[3] *Gen.* (1789) 74, Ord. 1.

[4] *Op. cit.* 320.

[5] *Prodr.* iii. 203, Ord. 77.

[6] *Veg. Kingd.* (1846) 719, Ord. 275 (*Alangiaceæ*).

[7] *Dict. Sc. Nat.* xxxv. 267.—Endl. *Gen.* 328 (*Gen. Santalaceis Affin.*).

[8] *Gen.* 949, 952.

[9] H. Bn. *Adansonia*, v. 196.

[10] *Adansonia, loc. cit.* 198.

Let the latter advance farther and we shall have an ovary with two cells, incomplete or complete, sometimes observed in *Nyssa,* and, in the *Alangieæ,* with dicarpellar gynæcium, an ovary with two complete cavities, each enclosing one ovule. Under this view the true *Combretaceæ* would not be the most perfect representatives of this family, to which they alone have hitherto been admitted. Hence the division into three series which, as a new order, we propose:—

I. Combreteæ.[1]—Flowers hermaphrodite or polygamous, with or without corolla, with unilocular pauciovulate ovary. Ovules equal or double in number that of the very imperfect parietal placentæ, and inserted near the summit, ordinarily attached by a long funicle,[2] with exterior micropyle. Seeds without albumen.—8 genera.

II. Nysseæ.—Flowers polygamo-diœcious, with polypetalous corolla, rarely absent. Ovary with one or more cells, generally complete, uniovulate. Ovule descending, attached by a short funicle, with exterior micropyle. Seeds albuminous.—3 genera.

III. Alangieæ.—Flowers hermaphrodite or rarely polygamous, with 4–10 petals. Ovary with one or two uniovulate cells. Ovule descending, inserted at top of internal angle by a short funicle, with micropyle finally lateral. Seeds albuminous.—1 genus.

The affinities of these three groups are manifold. We have spoken of those of the *Alangieæ* with the *Cornaceæ,* which, besides the characters derived from the ovule, are distinguished by their isostemonous andrœcium. The *Araliaceæ,* like the *Combretaceæ,* have the ovular micropyle turned outwards. It is admitted, as we shall also see, that they are distinct from the latter, in which, as in them, the ovarian partitions are complete, by their habit, their mode of inflorescence, their distinct stylary divisions and their embryo reduced to small dimensions; all characters of very small value. The *Onagrarieæ,* which present many analogies to the *Nysseæ,* have an indefinite number of ovules; or, if the number is definite, the descending ovules have an interior micropyle, as in the *Cornaceæ,* and the ascending ovules an exterior. In the *Rhizophoraceæ,* on the contrary, the descending ovules have the micropyle outward, as in the *Combretaceæ;* but the former are distinguished by their habit, their stipules, the organisation of their corolla and stamens, their style, analogous to that of the *Cornaceæ*, except in *Anisophyllæa*, which has nearly all the characters of the *Combreteæ*, but whose singular leaves and embryo with macropod radicle are very distinct. The closest affinities of the *Combreteæ* appear, as we have seen,[1] to be those which ally them to the *Quercineæ*. The female flower of a Chestnut, with its inferior ovary and the receptacular dilatation which surmounts it, with its epigynous stamens and descending ovules with exterior micropyle, appears to us altogether that of a *Terminalia* whose placentary partitions, always incomplete, are somewhat more advanced towards the axis of an ovary primarily unilocular in both cases. The exceptional cupule of the *Quercineæ*, so characteristic, is not found in the whole family of the *Castaneaceæ*, depending only upon a modification in the form of certain organs of vegetation, and not upon the organisation of the flower itself. The true place of the *Combretaceæ* appears to us then to be between the *Quercineæ*, the *Araliaceæ*, the *Onagrariaceæ*, and the *Cornaceæ*.

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[1] *Combretaceæ* R. Br.—*Terminaliaceæ* J. S. H. *Exp. Fam. Nat.* i. 178.—*Myrobalaneæ* J. *Dict. Sc. Nat.* xxxi. (1824) 458.—*Terminalieæ* DC. *Prodr.* iii. 9. Lindley, and later Bentham and Hooker (*Gen.* 689) have joined to the family, as a suborder, the *Gyrocarpeæ* and the *Illigereæ,* described by us with the *Lauraceæ* (*Hist. of Pl.* ii. 484, 485.

[2] Except always in the g. *Laguncularia,* where the funicle is very short.

The *Combreteæ* and *Alangieæ* are plants of tropical countries. The latter are confined to Asia, Africa, and Oceania; the former are common to both worlds. *Quisqualis*, *Macropteranthes*, *Guiera*, and *Calycopteris*, belong only to the old world; but the two principal genera, *Combretum* and *Terminalia*, are distributed, unequally indeed, between Asia, Africa, and America. *Lumnitzera*, *Laguncularia*, and *Conocarpus*,[2] are among those curious littoral plants which, like the Mangroves, develope themselves in the brackish waters of widely distant tropical shores. The first has been observed only in Asia, Africa, and Oceania, but the two latter are met with, likewise, in South America and tropical Africa. The *Nysseæ*, on the other hand, are trees of temperate regions. In North America *Nyssa* inhabits the most southern parts, Mexico and the United States. In India and Java it grows in small numbers on the mountains. *Camptotheca* and *Davidia* belong to eastern Tibet.

Uses.—Like the *Quercineæ*, to which we have several times compared them, these plants have generally an astringent bark and fruit.

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[1] See page 249.

[2] Vulg. *Mangliers flibustiers.*

Those of *Terminalia*, formerly very celebrated in therapeutics as tonics and astringents and still used as such in their native countries, where they are also employed especially for tanning skins and dyeing stuffs, were known under the name of *Myrobalans*,[1] applied also to other fruits borne by plants of very different families.[2] Especially distinguished among them were *Myrobalan citrine*[3] attributed to *Terminalia citrina*;[4] *M. Chebulic* to *T. Chebula*;[5] *M. Belleric* to *T. Bellerica.*[6] The bark of these trees, prescribed for inflammations and fevers, like that of some species of *Combretum*, yields a gum, sometimes sweet, as that of *Acacia arabica*, sometimes astringent, burning with a flame. *Terminalia* presents still another point of analogy to the Oaks in that their various organs, under the influence of insect puncture, develope galls[7] rich in tannin, good for dyeing and tanning. Such especially is *T. Chebula*, the galls of which, horn-shaped, large, flat, and hollow, give with alum a solid yellow colour, and with ferruginous clay, an excellent black dye. The root of *T. latifolia*[8] affords an anti-diarrhœtic in the Antilles. That of *T. Catappa*,[9] a beautiful Indian species, introduced and cultivated in tropical America, is also prescribed for flux, diarrhœa, dysentery, and its bark for gastric and bilious fever. They are useful for dyeing black. Its fruit is valued as an article of food and as a medicine. The same is the case with many other species of *Terminalia*, notably *T. alata*,[10] in India, is substituted for catechu in the treatment of angina, ulcers, and scorbutic eruptions; *T. macroptera*,[11] of Senegal, which, though astringent, has a root said to be purgative; *T. mauritiana*[1] (fig. 235–237), the seeds of which are edible; *T. angustifolia*,[2] which, in India, yields a kind of benzoin; *T. Buceras*,[3] of the Antilles, the astringent bark of which is employed in medicine; *T. erecta*[4] (fig. 240), the bark of which is useful in the treatment of ophthalmia, syphilitic, diabetic, and many other affections.[5] *Laguncularia racemosa*,[6] of the tropical African and North American shores, is also an astringent plant. *Quisqualis indica*[7] (fig. 229–234) has anthelmintic seeds of a sharp and bitter taste; its leaves also, either alone or with mustard, are prescribed for worms and affections of the lower intestines. Many species of *Combretum* are also useful. *C. coccineum*[8] (fig. 226–228) and *C. argenteum*, *grandiflorum*,[9] and *alternifolium*, have astringent barks. Several are tinctorial. The ashes of *C. glutinosum*[10] are used in Senegambia to fix the colours of indigo. In Guyana, the Galibees rubbed the muzzle of their dogs with the fruit of *T. Cacoucia* to increase their power of scent.[11] De Martius made known in Europe *Terminalia argentea*,[12] of Brazil, as yielding a drastic and resolutive juice used in his country for the same purposes as gum gutta. Several species of *Terminalia* of the same countries are tinctorial. In Mozambique an aromatic fatty matter is extracted from the seeds of *C. butyrosum*,[13] used for preparing food. *Alangium* has aromatic roots. The wood is good and the fruit edible, but often viscous and nearly tasteless. *A. decapetalum*[14] (fig. 245–248) and

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[1] Or *Myrobolans, Myrabolans,* by corruption. MÉR. and DEL. *Dict. Mat. Méd.* iv. 539.—GUIB. *Drog. Simpl.* ed. 6, iii. 282.—ROSENTH. *Synops. Plant. Diaphor.* 901.

[2] See vol. v. p. 164, note 5.

[3] Divided into yellow ovoid and angular, greenish and piriform, and brownish and round-ovoid (GUIB.).

[4] ROXB. *Cat. Hort. Calc.* 33.—DC. *Prodr.* iii. 12. n. 15.—*M. citrina* GÆRTN. *Fruct.* ii. 90, t. 97.

[5] RETZ. *Obs.* v. 31.—ROXB. *Pl. Coromand.* ii. 52, t. 197.—LINDL. *Fl. Med.* 67.—DC. *Prodr.* n. 14.—*M. Chebula* GÆRTN. *loc. cit.* (*Olivier des Nègres*, at Martinique).

[6] ROXB. *loc. cit.* 54, t. 198.—DC. *Prodr.* n. 13. —*M. Bellerica* BREYN. *Icon.* 18, t. 4.—GÆRTN. *loc. cit.*—*Tani* RHEED. *Hort. Malab.* iv. t. 10. The sources of the principal Myrobalans are indicated in this manner in standard works; but on this point there is much uncertainty. According to MÉRAT and DEL. (*loc. cit.*) citrine, chebulic, as well as indian and black M. are the fruits of the same species, brought to different degrees of maturity. "COLEBROOK has traced the changes of *M. chebula*, and has seen that its fruit undergoes six, each of which has received a distinct name among the Indians." (*Journ. de Bot.* vi. 212.) KŒNIG has given to *T. chebula* the name of *T. Myrobalanus citrina.* GUIBOURT, according to the authors cited, considers Indian M. as a green state of chebulic M.

[7] GUIB. *loc. cit.* 287, fig. 652.

[8] SW. *Fl. Ind. Occ.* ii. 747.—DC. *Prodr.* n. 11.

[9] L. *Mantiss.* 519.—LAMK. *Ill.* t. 848, fig. 1. —JACQ. *Ic. Rar.* i. t. 197.—DC. *Prodr.* n. 5.—ROSENTH. *op. cit.* 900.—*Juglans Catappa* LOUR. *Fl. cochinch.* (ed. 1790), 573 (*Bois canot*, *B. à huile*).

[10] ROTH *Nov. Spec.* 379.—*Pentaptera alata* BANKS.—ROSENTH. *op. cit.* 902.

[11] GUILL. and PERR. *Fl. Sen. Tent.* i. 276, t. 63.—LAWS, *Fl. Trop. Afr.* ii. 416 (*Rebreb*).

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[1] Lamk. *Dict.* i. 349; *Ill.* t. 848, fig. 2.—*Catappa mauritiana* Gærtn. f.

[2] Jacq. *Hort. Vindob.* iii. t. 100.—*T. Benzoin* L. f. *Suppl.*—*C. Benzoin* Gærtn. f. (*Faux-Benjoin*, *Bien-joint*).

[3] *Bucida Buceras* L. *Spec.* 556.—DC. *Prodr.* iii. 10.—Eichl. *Mart. Fl. Bras. Combret.* 94, t. 35, fig. 1. This species, pierced by insects, also produces galls rich in tannin (*Chêne français* of the Antilles).

[4] *Conocarpus erecta* L. *Syst.* 217.—Descourt. *Fl. Méd. Ant.* vi. t. 399.—Eichl. *loc. cit.* 101, t. 35, fig. 2 (*Manglier flibustier*, *M. droit*, *M. noir*).

[5] *T. glabrata* Forst. *trovancorensis* Wight, *Pamœa* DC. *crenulata* Roth. (Rosenth. *loc. cit.* 900–902), etc.

[6] See p. 282, note 2.

[7] L. *Spec.* 556.—Lamk. *Ill.* t. 357.—DC. *Prodr.* iii. 23.—*Bot. Mag.* t. 2033.—*Bot. Reg.* t. 492.—Rosenth. *op. cit.* 903.

[8] Lamk. *Dict.* i. 734; *Ill.* t. 282, fig. 2.—*C. purpureum* Vahl.—*Bot. Reg.* t. 429.—*Poivrea coccinea* DC. *Prodr.* iii. 18, n. 5.

[9] Don. *Edinb. New Phil. Journ.* (1824) 346.—DC. *Prodr.* n. 24.—Laws. *Fl. Trop. Afr.* ii. 423.—*C. Afzelii* Don.—*Poivrea grandiflora* Benth. *Niger*, 337.

[10] Perr. *Fl. Sen. Tent.* i. 288, t. 68.

[11] *Cacoucia coccinea* Aubl. *Guian.* t. 179.—Eichl. *Mart. Fl. Bras. Combret.* 122, t. 32.—*Schousbœa coccinea* W.

[12] Mart. and Zucc. *Nov. Gen. et Spec.* i. 43.—Eichl. *Mart. Fl. Bras. Combret.* 86, 126, t. 23.

[13] Car. *Journ. Linn. Soc.* iv. 167.—*Sheadendron butyrosum* Bertol. *Mém. Acad. Bologn.* (1850) 12, t. 4.

[14] Lamk. *Dict.* i. 174.—*A. acuminatum* Wight and Arn.—Rosenth. *op. cit.* 903.—*Grewia salvifolia* L. f. *Suppl.* 409 (ex Vahl, *Symb.* i. 61).—*Angolam* Rheed. *Hort. Malab.* iv. t. 17.

hexapetalum[1] are said to be purgative and diuretic. *Tupelos* has slightly acid drupes, especially *Nyssa capitata*[2] and *biflora*[3] (fig. 241–244), the fruit of which is sometimes substituted for citrons. That of *N. aquatica*,[4] *villosa*,[5] *scandens*,[6] is also eaten. The wood of these trees splits with difficulty, on account of the intricacy of their fibres; it is often used in the United States, but is little valued.[7] These trees are cultivated among us with some difficulty. Plants of the other series are met with only in conservatories, where certain species of *Combretum* and *Quisqualis* produce red flowers of a very fine effect.

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[1] LAMK. *loc. cit.*—DC. *Prodr.* iii. 203 (*Namidou*, *Kara-Angolam*).

[2] WALT. *Fl. Carol.* 253, n. 4.

[3] MICHX. *Fl. Bor.-Amer.* ii. 259.—*N. aquatica* L.? (ex MICHX.).

[4] L. *Syst.* (ed. 1780), iv. 358.

[5] MICHX. *op. cit.* 258.

[6] MICHX. ex ROSENTH. *op. cit.* 239. According to A. GRAY, there are in the northern United States only two species of *Nyssa; N. uniflora*, comprising *N. tomentosa*, *angulisans* and *grandidentata* MICHX. *N. multiflora* WANG. and comprising *N. villosa* W. and *sylvatica* MARSH. CHAPMAN adds in the south *N. aquatica* L. and *N. capitata* WALT.; in all, consequently only four American species, which, probably, present many variations.

[7] On the stem of a *Nyssa angulisans*, see TRÉCUL, *Ann. Sc. Nat.* sér. 3, xvii. 270. On the wood of the *Alangieæ* : LINDL. *Veg. Kingd.* 720. That of the *Combretaceæ* in general, and notably those growing in brackish waters, presents numerous peculiarities for study.

GENERA.

I. COMBRETEÆ.

1. **Combretum** L.—Flowers hermaphrodite or polygamo-diœcious; receptacle tubular-lageniform, constricted to apex, then dilated cupuliform; sepals 4, 5, valvate, glabrous or pilose within, sometimes glandularly incrassate at base, deciduous. Petals 4, 5, sometimes small (or very rarely 0). Stamens 8–10, 2-seriate; the oppositipetalous inserted higher; filaments elongate free, incurved above; anthers small introrse, 2-dymous, 2-rimose. Germen adnate within to concavity of receptacle, 1-locular; style subulate, at apex simple or slightly incrassate stigmatose. Ovules 2–6, suspended from apex of cell by a rather long funicle, anatropous; micropyle extrorsely superior. Fruit coriaceous or sub-spongy, sometimes sub-fleshy, 4–6-gonal or 4–6-pterous; wings short thick or often membranous; pericarp indehiscent or finally 4–6-partible. Seed 1, descending, elongate, sulcate or angular; coat membranous or coriaceous; cotyledons of exalbuminous embryo fleshy, oftener narrow, plicate contortuplicate or deeply sulcate, sometimes very rarely convolute.—Shrubs or more rarely trees, often climbing, sometimes spinous; leaves opposite or more rarely verticillate, very rarely alternate, petiolate, oftener membranous entire exstipulate; flowers in spikes or racemes, sometimes ramose, rarely secund; bracts small or rather large. (*Trop. Asia, Africa, America.*) See p. 263.

2. **Quisqualis** L.[1]—Flowers nearly of *Combretum*; tube of re-

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[1] L. *Gen.* n. 539.—J. *Gen.* 78.—Lamk. *Ill.* t. 357.—Poir. *Dict.* vi. 43; Suppl. iv. 640.—DC. *Prodr.* iii. 22.—Spach, *Suit. à Buffon*, iv. 316.—Endl. *Gen.* n. 6089.—Payer. *Organog.* 447, t. 105; *Fam. Nat.* 96.—B. H. *Gen.* 689, n. 12.—Hook. *Fl. Ind.* ii. 459.—*Sphalanthus* Jack, *Mal. Misc.* ex *Hook. Comp. to Bot. Mag.* i. 155.

ceptacle far produced beyond germen attenuate; sepals patent or recurved. Stamens 10, germen ovules 4, 5, etc. of *Combretum*. Fruit oblong coriaceous, acutely 5-gonal, 5-alate; seed 5-gonal. Embryo exalbuminous; cotyledons 2 (or rarely 3), thick fleshy, flat or concave within, convex or sulcate without.—Climbing shrubs; branches sarmentose; leaves opposite or subopposite entire; flowers[1] in spikes, sometimes compound, axillary and terminal. (*Trop. Asia and Africa.*[2])

3. **Lumnitzera** W.[3]—Flowers (nearly of *Combretum*) hermaphrodite; receptacle oblong, attenuate on both sides, externally increased to middle by 2 lateral adnate bracteoles, produced somewhat beyond germen and finally dilated. Sepals 5, equal or unequal, imbricate, persistent. Petals 5, oblong patent. Stamens[4] 10 and germen of *Combretum*; ovules 2–6;[5] funicle elongate. Fruit oblong, ovoidly attenuate, or subfusiform compressed woody, laterally obtuse angled to remains of bracteoles, crowned with persistent calyx. Seed linear;[6] cotyledons of exalbuminous embryo convolute.—Trees and shrubs; leaves alternate, inserted at summit of twigs, subsessile, obovate-cuneate, thick coriaceous enervate, entire or crenate; flowers[7] in short axillary and terminal racemes. (*All tropical shores of old world.*[8])

4. **Laguncularia** Gærtn. f.[9]—Flowers polygamous (nearly of *Lumnitzera*); receptacle (in male flower short) turbinate rather terete not produced beyond germen, laterally increased by 2 small adnate bracteoles. Calyx urceolate, 5-fid, persistent. Petals 5, small, caducous. Stamens 10; filaments short incurved; anthers cordate enclosed or slightly exserted. Germen internally adnate to

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[1] White or red, changeable.

[2] Spec. 3, 4, Rumph. *Herb. Amboin.* v. 71, t. 38.—Burm. *Fl. Ind.* t. 28, fig. 2.—P.-Beauv. *Fl. Ow. et Ben.* i. 55, t. 34.—Bl. *Bijdr.* 641.—Roxb. *Fl. Ind.* ii. 426.—Presl. *Epim.* 216.—Wight and Arn. *Prodr.* i. 318.—Wight, *Ill.* t. 92.—Harv. and Sond. *Fl. Cap.* ii. 512.—Laws. *Oliv. Fl. Trop. Afr.* ii. 435.—Hook. *Bot. Mag.* t. 2033.—*Bot. Reg.* t. 492.—Walp. *Rep.* ii. 68; v. 663; *Ann.* iii. 860.

[3] *N. Schz. Ges. Nat. Fr. Berl.* iv. 186.—DC. *Prodr.* iii. 22.—Endl. *Gen.* n. 6084.—B. H. *Gen.* 687, n. 7.—Hook. *Fl. Ind.* ii. 451.—*Pyrranthus* Jack, *Mal. Misc.* ex *Hook. Comp.* i. 156.—*Petaloma* Roxb. *Fl. Ind.* ii. 372 (not Sw.).—*Funkia* Dennst. *Hort. Malab.* vi. 37 (ex Endl.).

[4] Anthers in younger bud and at anthesis introrse. Filaments in bud incurvo-conduplicate.

[5] Dissepiments in earliest stage distinct more or less prominent.

[6] Often sterile; fruit hence vacant.

[7] White coccineus or (?) yellow.

[8] Spec. 4, 5, Wight and Arn. *Prodr.* i. 316.—Presl. *Rel. Hænk.* ii. 25.—Gaudich. *Freycin. Voy. Bot.* t. 104, 105 (*Laguncularia*).—Benth. *Fl. Austral.* ii. 503.—Laws. *Fl. Trop. Afr.* ii. 418.—Walp. *Rep.* 63; *Ann.* i. 289; iv. 672.

[9] *Fruct.* iii. 209, t. 217.—DC. *Prodr.* iii. 17.—Spach, *Suit. à Buffon*, iv. 304.—Endl. *Gen.* n. 6083.—B. H. *Gen.* 688, n. 9.—*Sphenocarpus* L. C. Rich. *Anal. Fruit.* 92.—*Horau* Adans. *Fam. des Pl.* ii. 80.

receptacle and crowned with thick epigynous disk; style short, at apex stigmatose 2-lobed. Ovules 2; funicle subapical very short (or 0). Fruit dry coriaceous, indehiscent, elongate-obovoid, sometimes longitudinally cortulate, sericeous, crowned with persistent calyx. Seed 1, descending, conformed to cell; cotyledons of exalbuminous embryo highly convolute.—Small trees; leaves opposite petiolate, elliptical or oblong, obtuse, entire thick coriaceous, 2-glandular at base; flowers[1] in axillary and terminal ramose spikes, often 3-spiked. (*Trop. America and west. coast of trop. Africa.*[2])

5. **Macropteranthes** F. MUELL.[3]—Flowers hermaphrodite (of *Laguncularia*), 5-merous. Stamens 10, or fewer; anthers sometimes ciliate. Germen adnate within to cavity of receptacle not constricted at apex and laterally winged with 2 adnate bracteoles. Ovules in cell 10–16, inserted under apex by linear-elongate funicles. Fruit (indehiscent ?) crowned with calyx and augmented to middle by 2 wide foliaceous horizontal wings; seeds . . . ?—Small sericeous trees; leaves opposite or fasciculate small entire; flowers axillary 2-nate on peduncle. (*Trop. Australia.*[4])

6. **Guiera** ADANS.[5] — Flowers hermaphrodite (of *Combretum*), 5-merous; receptacle attenuate on both sides, produced beyond germen. Petals 5, narrow, perceptibly dilated at apex. Stamens 10, exserted; anthers small didymous. Germen, disk, etc., of *Lumnitzera*; ovules 4, 5; funicles elongate. Fruit coriaceous, indehiscent, elongate-cylindrical and curved,[6] sericeo-villose, crowned with persistent calyx. Seed 1, narrow; cotyledons of exalbuminous elongate embryo convolute.—A somewhat tomentose shrub; leaves opposite, petiolate, entire apiculate black-spotted; flowers[7] crowded in axillary globose solitary pedunculate capitules; bracts 4, foliaceous inserted under capitule, valvately connivent in common involucre around enclosed flowers, finally reflexed at anthesis. (*Trop. west. Africa.*[8])

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[1] Small.

[2] Spec. 1, *L. racemosa* GÆRTN. F.—DC. *Prodr.* ii. 17.—EICHL. *Mart. Fl. Bras. Combret.* 102, t. 35, fig. 3.—LAWS. *Fl. Trop. Afr.* ii. 419.—WALP. *Rep.* ii. 63.—H. B. ADANS. xi. 378.—*L. glabrifolia* PRESL. *Rel. Hænk.* ii. 22.—*Conocarpus racemosa* L. *Spec.* 251.—JACQ. *Amer.* 80, t. 53.—SW. *Obs.* 79.—*Schousbœa commutata* SPRENG. *Syst.* ii. 332.—*Bucida Buceras* VELLOZ. *Fl. Flum.* 172; iv. t. 87 (not L.).

[3] *Fragm.* iii. 91, 151.—B. H. *Gen.* 687, n. 8.

[4] Spec. 3, F. MUELL. *Fragm.* ii. 149 (*Lumnitzera*).—BENTH. *Fl. Austral.* ii. 504.

[5] Ex J. *Gen.* 320.—LAMK. *Ill.* t. 360.—POIR. *Dict.* Suppl. ii. 861.—DC. *Prodr.* iii. 17.—SPACH, *Suit. à Buffon*, iv. 305.—ENDL. *Gen.* n. 6085.—B. H. *Gen.* 687, n. 6.

[6] Long siliquiform.

[7] Minute, black-spotted.

[8] Spec. 1, *G. senegalensis* LAMK.—GUILLEM. et PERR. *Fl. Sen. Tent.* i. 282, t. 66, fig. 2.—LAWS. *Fl. Trop. Afr.* ii. 418 (nat. *Guierr*).

7. **Calycopteris** Lamk.[1] — Flowers hermaphrodite (nearly of *Guiera* or *Combretum*) apetalous, 5-merous; receptacle enclosing inferior germen and not produced beyond. Sepals 5, persistent, accrescent. Stamens 10, enclosed, anthers 2-dymous. Germen 3-ovulate (of *Combretum*). Fruit (small) ovoid, 5-gonal, 5-sulcate, somewhat villose, crowned with 5 accrescent membranous venose obtuse and patent sepals, indehiscent, 1-spermous; cotyledons of exalbuminous embryo convolute.—A climbing shrub,[2] glabrous or oftener sericeo-villose; leaves generally opposite petiolate entire acuminate; flowers crowded in axillary simple or terminal and very ramose racemes. (*East. India.*[3])

8. **Terminalia** L.[4]—Flowers hermaphrodite or polygamo-diœcious (nearly of *Combretum*) apetalous; tube of receptacle ovoid or subcylindrical, sometimes elongate-lageniform, not at all or scarcely, sometimes a little (*Ramatuella*[5]) or farther (*Anogeissus*[6]) produced beyond germen, dilated above to a campanulate or suburceolate cupule, glabrous or pilose within, sometimes glandular and calyciferous at margin. Sepals rarely 4, oftenest 5, free or connate at base, valvate, generally deciduous or rarely (*Bucida*[7]) persistent. Stamens 4, 5, or most often 8–10, 2-seriate; filaments subulate incurved, finally exserted; the alternisepalous inserted higher; anthers versatile or rarely (*Buchenavia*[8]) not mobile. Germen inferior; style generally incrassate at base, at apex stigmatose simple and oftener not dilated. Ovules in cell 2, 3 (of *Combretum*). Fruit ovoid (*Myrobalanus*[9]) or ellipsoid or elongate,[10] or angular, ancipiti-

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[1] *Ill.* t. 357.—Poir. *Dict.* Suppl. ii. 41.—B. H. *Gen.* 686, n. 2.—*Getonia* Roxb. *Pl. Coromand.* i. 61, t. 87; *Fl. Ind.* ii. 428.—Gærtn. f. *Fruct.* iii. 210, t. 217.—DC. *Prodr.* iii. 15.—Endl. *Gen.* n. 6078.

[2] On account of its opposite leaves, inflorence and accrescent calyx very like some *Verbenaceæ* and *Malpighiaceæ*; but the flower is quite that of *Guiera* and allied genera.

[3] Spec. 1, 2. Wight and Arn. *Prodr.* i. 315 (*Getonia*).

[4] *Mantiss.* n. 1283.—J. *Gen.* 76.—Lamk. *Dict.* i. 348; Suppl. i. 557; *Ill.* t. 848.—DC. *Prodr.* iii. 10.—Spach, *Suit. à Buffon*, iv. 298.—Endl. *Gen.* n. 6076.—Payer, *Fam. Nat.* 97.—Hook. *Fl. Ind.* ii. 443.—Baker, *Fl. Maurit.* 111.—B. H. *Gen.* 685, 1006, n. 1 (incl.: *Anogeissus* Wall. *Badamia* Gærtn. *Buchenavia* Eichl. *Bucida* L. *Catappa* Gærtn. *Chicarronia* A. Rich. (?) *Chuncoa* Pav. *Conocarpus* Gærtn. *Myrobalanus* Gærtn. *Pentaptera* Roxb. *Ramatuella* H. B. K. *Vicentia* Allem.).

[5] H. B. K. *Nov. Gen. et Spec.* vii. 254, t. 656.—DC. *Prodr.* iii. 16.—Endl. *Gen.* n. 6080.—B. H. *Gen.* 686, n. 4.

[6] Wall. *Cat.* n. 4014.—Endl. *Gen.* n. 6082.—B. H. *Gen.* 687, n. 5.—Hook. *Fl. Ind.* ii. 450.

[7] L. *Gen.* n. 541.—Lamk. *Ill.* t. 356.—DC. *Prodr.* iii. 9.—Endl. *Gen.* n. 6075 (part).—*Buceras* P. Br. *Jam.* ii. 310.

[8] Eichl. *Flora* (1866), 164; *Mart. Fl. Bras. Combret.* 95, t. 25.

[9] Gærtn. *Fruct.* ii. 90, t. 97. — *Badamia* Gærtn. *loc. cit.*—*Pamea* Aubl. *Guia* . 946, t. 359 —*Fatræa* J. *Dict. Sc. Nat.* xvi. 206.

[10] In *Bucida* it often happens, from the attack of insects, that the leaves of the fruit (as in some plants of the Order) grow out in long siliquiform horns (whence the generic name).

compressed (*Catappa*[1]), 2–7-alate; wings thick, sometimes sinuate or incised (*Ramatuella*) thick coriaceous or widely membranous; exocarp thin or more rarely thick, fleshy or coriaceous; putamen coriaceous or osseous, 1-spermous, straight, curved or much recurved[2] (*Conocarpus*[3]). Seed ovoid or elongate, terete or angular; coat thin; cotyledons of exalbuminous embryo convolute.—Trees or shrubs; leaves alternate or more rarely opposite and 2-glandular at base (*Chuncoa*,[4] *Pentaptera*[5]), often collected at summit of twigs, sessile or oftener petiolate, generally entire, sometimes pellucid or dark-spotted; flowers[6] spicate or more rarely racemose; spikes simple or more or less ramose, elongate, loose or in short capitules; or sometimes (*Anogeissus*, *Conocarpus*, *Ramatuella*) densely capitate. (*All trop. regions*.[7]) See p. 267.

II? NYSSEÆ.

9. **Nyssa** L.—Flowers polygamo-diœcious; receptacle of males shortly cupular or subplane. Calyx small, very small or subnil; teeth 5-∞. Petals 5–∞, imbricate. Stamens 5–18, or ∞, inserted with perianth around thick pulvinulate disk entire or crenate or lobed, glabrous smooth above or produced to a central cone (rudiment of gynæcium ?); filaments free; anthers sub-2-dymous; cells laterally or introrsely rimose. Receptacle of female or hermaphrodite flower tubular, urceolate or subcampanulate, enclosing adnate germen; calyx as in males. Petals small or 0. Rudimentary stamens 0 or few anantherous or with effete anthers. Germen inferior, 1-locular (or very rarely 2-locular; dissepiments perfect or

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[1] GÆRTN. *Fruct.* ii. 206, t. 127; iii. 207, t. 217.—*Adamaram* RHEEDE, ex ADANS. *Fam. des Pl.* ii. 445.—*Tanibouca* AUBL. *Guian.* 448, t. 178.

[2] Fruit in *Conocarpus* and others imbricate in a dense cone.

[3] GÆRTN. *Fruct.* ii. 470, t. 177; iii. 205, t. 216.—LAMK. *Dict.* ii. 96; *Ill.* t. 126.—DC. *Prodr.* iii. 16 (part).—SPACH, *Suit. à Buffon*, iv. 303.—ENDL. *Gen.* n. 6081.—B. H. *Gen.* 686, n. 3. —*Rudbeckia* ADANS. *Fam. des Pl.* ii. 80 (not L.).

[4] PAV. ex J. *Gen.* 76.—POIR. *Dict.* Suppl. ii. 258.—ENDL. *Gen.* n. 6079.—*Gimbernatia* R. et PAV. *Prodr.* 138, t. 36.— ? *Chicarronia* A. RICH. *Fl. Cub.* 529, t. 43.—*Vicentia* ALLEM. *Diss. de Vicentia acuminata* Rio Janeiro (1844).—WALP. *Ann.* iii. 934.—EICHL. *Mart. Fl. Bras. Combret.* 92, t. 33, fig. 15 (fl. 4-merous).

[5] ROXB. *Fl. Ind.* ii. 437.—ENDL. *Gen.* n. 6077.

[6] Small or moderate-sized, greenish, whitish or more rarely red, pale violet or purplish, sometimes scented.

[7] Spec. 100. JACQ. *St. Am.* t. 52 (*Conocarpus*). —WIGHT and ARN. *Prodr.* i. 312.—WIGHT, *Ill.* t. 91; *Icon.* t. 172.—A. S. H. *Fl. Bras. Mer.* ii. 239, t. 128.—GUILLEM. et PERR. *Fl. Sen. Tent.* i. 276, t. 63, 64; 278 (*Conocarpus*), 279, t. 65 (*Anogeissus*).—TUL. *Ann. Sc. Nat.* sér. 4, vi. 90. —GRISEB. *Fl. Brit. W.-Ind.* 276.—HARV. and SOND. *Fl. Cap.* ii. 508.—BENTH. *Fl. Austral.* ii. 496.—THW. *Enum. Pl. Zeyl.* 103.—EICHL. *Mart. Fl. Bras. Combret.* 81, t. 23, 24, 33, 34; 94, t. 35, i. (*Bucida*); 95, t. 25 (*Buchenavia*); 99, t. 35 ii. (*Ramatuella*); 100, t. 35, ii. (*Conocarpus*).— LAWS. *Fl. Trop. Afr.* ii. 415, 417 (*Conocarpus*, *Anogeissus*).—*Bot. Mag.* t. 3004.—WALP. *Rep.* ii. 60, 63 (*Anogeissus*); *Ann.* i. 289; ii. 524; iv. 672.—*Croton Benzoe* L. *Mantiss.* 297 (DC. *Prodr.* iii. 11).

imperfect); style straight or recurved or revolute, convexity sulcate, simple or at stigmatose apex 2-fid, girt at base with thick epigynous disk. Ovule 1 (or very rarely 2), descending; micropyle extrorsely superior. Fruit drupaceous oblong, areolate at apex; putamen terete or sulcate. Albumen of descending seed fleshy; cotyledons of inverted embryo foliaceous and equilateral to albumen.—Trees or shrubs, sometimes sericeous; leaves alternate petiolate, exstipulate, entire or coarsely dentate or lobate; flowers axillary, inserted at summit of pedunculum, capitate or shortly racemose (glomerulate ?), bracteate and bracteolate; bracts sometimes involucrate; female flowers fewer, sometimes solitary. (*South. North America, mount. Asia and temp. Malaya.*) See p. 269.

10 ? **Camptotheka** Dcne.[1] — Flowers polygamous (nearly of *Nyssa*); calyx cupular. Petals 5, imbricate. Stamens 10, 2-seriate, inserted under epigynous disk; cellules of anthers 4, appended to conical connective; each introrsely unequally valvicide.[2] Germen (in male flower effete) inferior; ovule . . . ?; style 2-fid (in male flower very short, buried in disk). Fruit capitate compressed subsamaroid, truncate at apex and crowned with remains of disk; mesocarp suberose; endocarp thin. Seed descending elongate; testa thin; albumen fleshy; embryo (greenish) equal to albumen, cotyledons thin; radicle superior.—A tree; leaves alternate, deciduous; flowers capitate; capitules (glomeruliferous) in terminal raceme and pedicellate; bracts and bracteoles lateral involucrating cymules. (*East. Tibet.*[3])

11 ? **Davidia** H. Bn.[4] — Flowers polygamo-diœcious; males 1-androus; stamens ∞, collected in minute enclosed globular capitule, around slightly projecting base of filaments; filaments free subulate, inserted in foveoles of receptacle; anther cells ovate, free on both sides, sublaterally rimose. Female flower in capitules 0, or 1, laterally inserted above middle of receptacle, oblique; receptacle proper of flower subovoid sacciform, enclosing adnate germen and bearing subepigynous perianth consisting of ∞ small unequal subulate folioles. Germen inferior, 6–10-locular, attenuate beyond perianth; style conical, externally rugose, at apex divided into radiating lobes, sulcate and stigmatose within, equal in number to cells. Ovules in complete cells solitary, inserted a little below apex,

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[1] *Bull. Soc. Bot. de Fr.* xx. 157.

[2] "Pollen 3-gonal like that of *Onagrarieæ*."

[3] Spec. 1. *C. acuminata* Dcne. *loc. cit.*

[4] *Adansonia*, x. 114.

descending; micropyle extrorsely superior. Hermaphrodite flower in other respects similar to female and augmented by short straight hypogynous (fertile or sterile) stamens within the perianth. Fruit...?—A tree; leaves alternate, petiolate, cordato-acuminate serrate penninerved, sub-3–7-nerved at base;[1] flowers precocious; capitules terminal pedunculate; bracts 2, subopposite, wide foliaceous, conformed and equal to leaves, petaloid coloured (white), involucrate and finally expanded. (*East. Tibet.*[2])

III? ALANGIEÆ.

12. **Alangium** Lamk.—Flowers hermaphrodite or rarely polygamous; receptacle concave, turbinate, campanulate, or subcylindrical, enclosing adnate germen. Calyx inserted at margin, subentire truncate or 4–10-dentate. Petals 4–10, lorate or linear, valvate, finally reflexed or revolute. Stamens inserted with perianth (epigynous), equal in number and alternating with petals or 2–4 times as many; filaments free or connate at base, inserted under epigynous disk; anthers linear-elongate, introrse or laterally rimose. Germen inferior, 1–2-locular or more rarely 3-locular, septa perfect or imperfect above; style girt at base with epigynous cupular or pulvinate disk, at stigmatose apex clavate or capitate, oftener minutely 4–∞-lobate. Ovule in each cell 1, inserted under apex, descending; micropyle extrorsely (?) superior, finally oftener lateral. Fruit drupaceous, crowned with calyx or its scar; exocarp thin or thick fleshy; putamen more or less hard, sometimes crustaceous, 1–2-spermous. Seed oblong; integument thin; albumen fleshy, externally smooth or sometimes sinuate or ruminate; cotyledons of axile embryo foliaceous, digitinerved at base, or flat, or slightly corrugate or sometimes contortuplicate; radicle terete superior.—Trees or shrubs, unarmed or sometimes spinescent, glabrous or tomentose; leaves alternate petiolate exstipulate, entire or angular-lobate, at base equal or sometimes unequal, penninerved or sometimes digitinerved at base; flowers in axillary more or less compound ramose cymes; branches of inflorescence elongate or sometimes more or less contracted; pedicels generally articulate. (*Asia, Oceania and trop. Africa, Malacca.*) See p. 271.

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[1] The younger sericeous beneath or on both sides.

[2] Spec. 1. *D. involucrata* H. Bn. *loc. cit.*

LIII. RHIZOPHORACEÆ.

I. MANGROVE SERIES.

The Mangroves are especially known by their long adventitious roots which descend into the mud, whence the name *Rhizophora*[1] (fig. 253–260). They have regular and hermaphrodite flowers, the concave

Rhizophora Mangle.

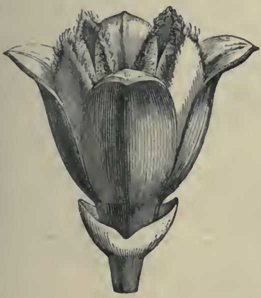

Fig. 254. Flower ($\frac{3}{1}$).

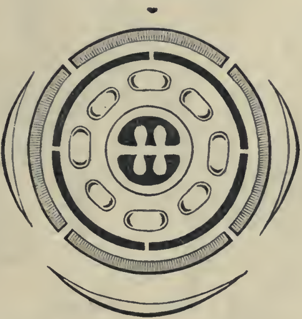

Fig. 255. Diagram.

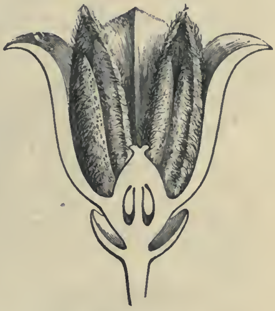

Fig. 256. Long. sect. of flower.

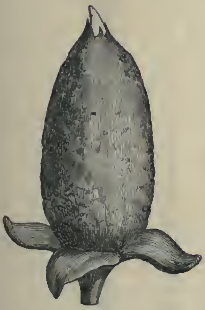

Fig. 258. Fruit.

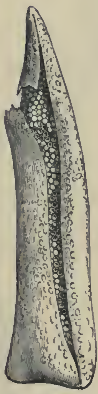

Fig. 257. Dehiscent stamen.

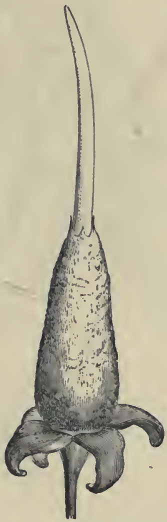

Fig. 260. Fruit, with germinating seed.

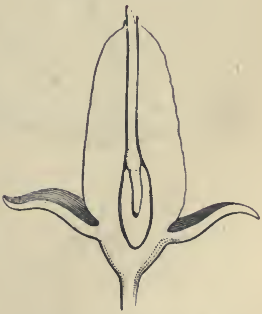

Fig. 259. Long. sect. of fruit.

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[1] L. *Gen.* n. 592 (part).—J. *Gen.* 213, 453.—Lamk. *Dict.* vi. 160; *Ill.* t. 396.—Dup.-Th. *Desvx. Journ. Bot.* ii. 31, t. 4.—DC. *Prodr.* iii. 32 (part).—Spach, *Suit. à Buffon*, iv. 332.—Endl. *Gen.* n. 6098.—H. Bn. *Payer Fam. Nat.* 360.—B. H. *Gen.* 678, n. 1.—Hook. *Fl. Ind.* ii. 435.—*Mangle* Plukn. ex Adans. *Fam. des Pl.* ii. 445.

receptacle of which encloses the inferior portion of the ovary and bears on its margin the stamens and perianth. The latter is double,

Rhizophora Mangle.

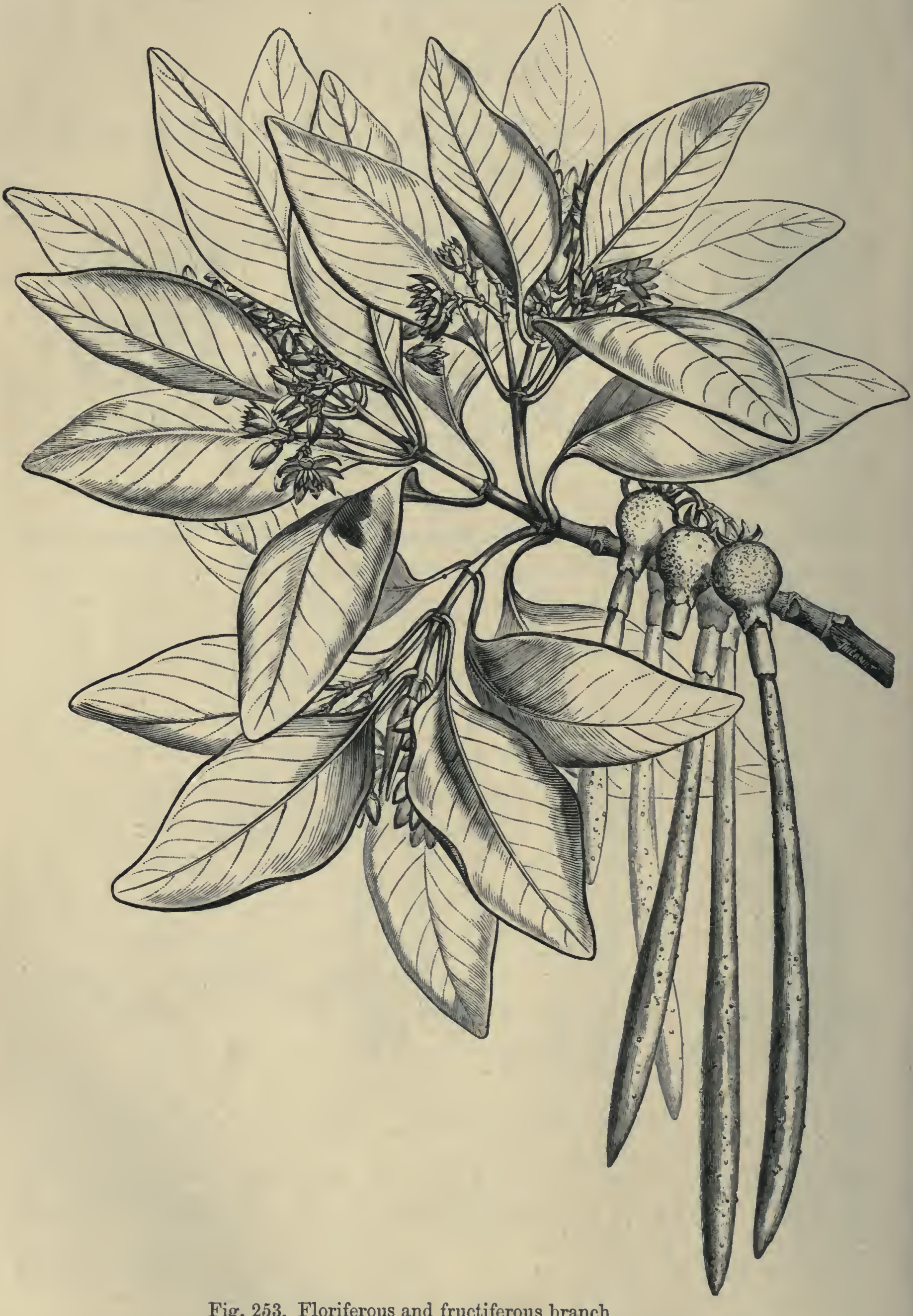

Fig. 253. Floriferous and fructiferous branch.

formed of a coriaceous calyx of four thick and valvate persistent sepals, one anterior, another posterior and two lateral (fig. 255), and four alternate petals, longer, equally valvate, with a margin often cut into fine induplicate laciniæ. The stamens, eight in number, are superposed, four to the sepals and four, longer, to the petals.[1] Each is formed of a filament very short or nil and a basifixed elongate anther with two cells dehiscing longitudinally in quite a peculiar manner[2] (fig. 257). The gynæcium is composed of an ovary partly inferior and hollowed into two cells, one anterior, the other posterior; it is surmounted by a very short style, almost immediately divided into two very small stigmatiferous lobes. In the internal angle is seen a placenta supporting two collateral descending anatropous ovules with micropyle directed upwards and outwards.[3] The fruit, accompanied at its base by the persistent and generally reflexed calyx, is coriaceous, indehiscent, monospermous. The seed is remarkable for the comportment of its fleshy embryo, destitute of albumen, but often surrounded by a soft matter which appears to play its part. The cotyledons are conferruminous, and the superior radicle is considerably elongated while the fruit still remains attached to the tree. It thus takes the form of a long pointed club and perforates the summit of the pericarp (fig. 253, 258–260) to descend vertically to the soil into which the radicle sinks before the upper portion of the embryo is disengaged. *Rhizophora* consists of trees met with in all the tropical regions of the globe. Their long adventitious roots support them firmly at the bottom of the water, above which rises the thick stem with opposite branches and decussate petiolate, elliptic, entire, glabrous, thick and coriaceous leaves, accompanied by large interpetiolate and caducous stipules. The flowers[1] are axillary, collected in bi- or triparous, rarely simple, more generally ramified cymes at the summit of a common peduncle; they are sessile or pedicellate, articulate, with two connate bracteoles forming a sort of involucel. Half a dozen species[2] are admitted in this genus; but perhaps this number may be reduced by one half.

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[1] It not unfrequently happens that at adult age no stamen is seen in front of the sepals, but that within each petal are two, one of which is smaller than the other and may remain sterile. This arises, as we have shown (*Bull. Soc. Linn. Par.* 58), from the stamen primarily superposed to the sepal having, by a later displacement, located itself with the oppositipetalous stamen, which it has slightly displaced, within the petal to which this latter corresponded. There are sometimes, it is said, 12-androus flowers in this genus.

[2] GRIFFITH, who made a study of these plants (*On the Fam. of Rhizophoreæ*, ex *Trans. of Med. and Phys. Soc. Calc.*; *Ann. Sc. Nat.* sér. 2, x. 117; *Icon.* iv. t. 640), has confirmed and extended the researches of JACQUIN (*St. Amer.* 142) and of R. BROWN, who, in his mem. on the *Rafflesia* (*Trans. Linn. Soc.* xiii. p. i. 214; *Misc. Works* [ed. BENN.], i. 369), has established that the membrane of the anther cells is detached at a certain moment to set the pollen at liberty. The lines of dehiscence are but faintly marked on the sides of the anthers and may extend to only a portion of their height. Below the partition extend numerous large cavities, nearly spherical, containing the grains of pollen which are exposed when the superficial membrane is detached, which is sometimes effected in a tolerably regular manner. These anthers have often been described as "multilocellate."

[3] Their thick coat is double.

From the genus *Rhizophora* have been separated certain species which, with the same organs of vegetation, present notable differences in their flowers. Such is *Ceriops*, found on most tropical shores of Asia, Africa, and Oceania, which has 4–6-merous flowers, with a valvate calyx and petals sloping to the summit and bordered, especially in their upper portion, with long stipitate glands. The stamens, in appearance, are superposed in pairs to each petal which receives them in its cavity, and the inferior ovary contains three incomplete and biovulate cells. The flowers, not numerous, are grouped in contracted cymes as a whole resembling a capitule, and are geminate in a small involucre at the summit of a short and thick pedicel. *Bruguiera* (fig. 261–263) was also formerly included in

Bruguiera gymnorhiza.

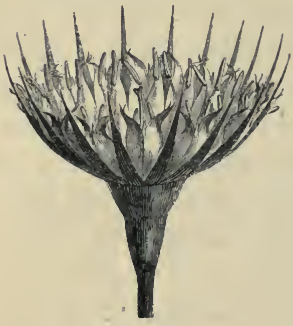

Fig. 261. Flower.

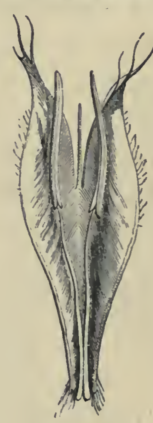

Fig. 263. Petal with the two stamens it envelops.

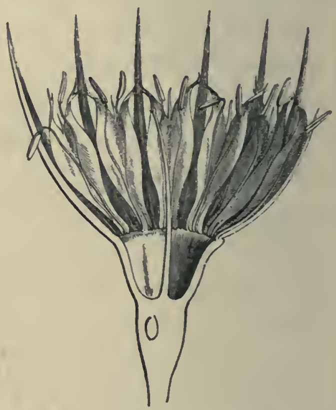

Fig. 262. Long. sect. of flower ($\frac{3}{2}$).

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[1] White, coriaceous..

[2] Wight and Arn. *Prodr.* i. 310.—Arn. *Ann. Nat. Hist.* i. 361.—Wight, *Icon.* t. 238.—Harv. and Sond. *Fl. Cap.* i. 513.—Oliv. *Fl. Trop. Afr.* ii. 407.—Tul. *Ann. Sc. Nat.* sér. 4, vi. 108.—Benth. *Fl. Austral.* ii. 493.—Miq. *Fl. Ind.-Bat.* i. p. i. 585; Suppl. 125, 323. –Seem. *Fl. Vit.* 91.—Griseb. *Fl. Brit. W.-Ind.* 274.—Walp. *Rep.* ii. 70; *Ann.* iv. 675.

Rhizophora. It has flowers constructed like those of *Ceriops*, but much larger, with from eight to fifteen narrow and pointed sepals, the same number of oblong petals, much sloped at the summit and near the base internally replicate upon themselves in such a manner as closely to envelope a pair of stamens with elongate anthers, apparently superposed to each of them[1] (fig. 263). The inferior ovary, adnate to the bottom of the receptacle, has two, three, or four cells, more or less complete, with two descending ovules in each. The fruit is like that of *Rhizophora*, as which *Bruguiera* also has the same organs of vegetation, and the flowers are axillary, solitary or in cymes. They inhabit the same maritime shores as *Ceriops*.

In *Kandelia*, which grows on the coasts of eastern India, the organs of vegetation, the fruit, the mode of germination, &c., are all those of *Rhizophora*; but the flowers, grouped in small numbers (in cyme) at the summit of a common peduncle, are of 5 or 6 parts, with petals finely and deeply laciniate at the margin, and an inferior ovary of which the three biovulate cells communicate to a greater or less extent; the andrœcium is formed of an indefinite number of stamens with long and slender filaments and small introrse anthers.

II. BARRALDEIA SERIES.

In the hermaphrodite and regular flowers of *Barraldeia*[2] (fig. 264–269), the cavity of the receptacle contains the inferior ovary, whilst its margins, lined with an epigynous disk, forming a double or triple annular cushion, bear the perianth and andrœcium. The former is represented by a valvate calyx of four or five triangular sepals and a corolla of the same number of petals, entire, bilobed, crenelate or laciniate at the margins and finally induplicate. The andrœcium is formed of a number of stamens double that of the petals, disposed in two verticils and alternating with an equal number of lobes of the disk. There is one stamen within each petal which envelopes it more or less in its cavity, and one in each interval between the petals.[1] Each is formed of a free filament, at first incurved at the summit, and of a short bilocular introrse anther dehiscing by two longitudinal clefts. The inferior ovary, the summit of which only is free in some species, is surmounted by a slender style the capitate extremity of which is divided into a number of stigmatiferous lobes equal to that of the cells. The latter vary from two to five, superposed to the petals when equal in number, and enlose each two lateral descending ovules, completely or incompletely anatropous, with micropyle directed upwards and outwards.[2] The fruit, small, coriaceous, surmounted by the remains of the calyx,[3] contains generally only one fertile reniform seed, the thick coats of

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[1] But this is only in appearance, these two stamens belonging to two different verticils and being rarely nearly equal. Oftener one is smaller than the other which primarily corresponded to a sepal but has become displaced as in certain *Rhizophora* (see p. 289, note 1) and especially in *Bruguiera*.

[2] Dup.-Th. *Gen. Nov. Madag.* (1806) 24.—DC. *Prodr.* i. 732.—*Diatoma* Lour. *Fl. Cochinch.* (ed. 1790) 295 (nec *alior.*).—*Demidofia* Dennst. *Hort. Malab.* iv. 13 (not of others).—*Carallia* Roxb. *Pl. Coromand.* iii. (1819) 8, t. 211; *Fl. Ind. Or.* ii. 481.—Hook. *Fl. Ind.* ii. 439.—R. Br. *Congo*, 437.—DC. *Prodr.* iii. 33.—Endl. *Gen.* n. 6102.—Benth. *Journ. Linn. Soc.* iii. 67, 74.—H. Bn. *Adansonia*, iii. 24, 36; *Payer Fam. Nat.* 361.—B. H. *Gen.* 680, n. 5.—*Symmetria* Bl. *Bijdr.* 1130.—*Baraultia* Steud. *Nom.* 101.—*Petaloma* DC. *Prodr.* iii. 294.—*Catalium* Ham. mss. (ex Endl.).

Barraldeia integerrima.

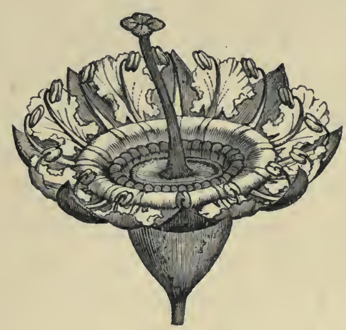

Fig. 264. Flower ($\frac{8}{1}$).

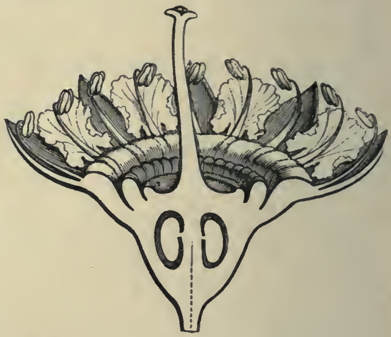

Fig. 266. Long. sect. of flower.

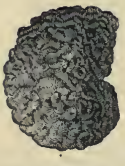

Fig. 268. Seed.

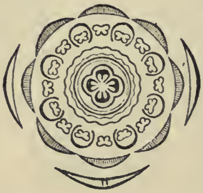

Fig. 265. Diagram.

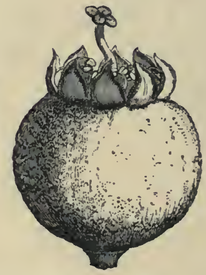

Fig. 267. Fruit ($\frac{4}{1}$).

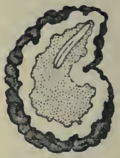

Fig. 269. Long. sect. of seed.

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[1] The latter is generally a little smaller than the oppositipetalous stamen.

[2] They have a double coat.

[3] As also of the stamens and style.

which cover a fleshy albumen, surrounding a more or less curved embryo, of which the radicle is superior and the cotyledons are flat. Seven or eight species[1] of *Barraldeia* are known, natives of the tropical regions of Africa, Asia, and Oceania. They are trees or shrubs with rounded branches, somewhat swollen at the level of the leaves, which are opposite, petiolate, thick, entire, glabrous, penninerved, entire or finely dentelate and accompanied by interpetiolate caducous stipules ordinarily but slightly developed. The flowers[2] are disposed in the axil of the leaves in bi- or triparous cymes, generally much ramified.

Close beside *Barraldeia* is placed *Crossostylis*, which is extremely like, presenting quite the same variations as to the absolute number of stamens, with 4- or 5-merous flowers. They differ chiefly in the ovary, only partly inferior, in the very variable number of more or less incomplete, biovulate cells, in their fleshy fruit, tardily loculicidal, with seeds furnished with a voluminous axil and a straight embryo. It comprises Oceanic shrubs. As in *Barraldeia* the petals are sometimes entire, sometimes more or less laciniate. The flower of *Gynotroches*, a shrub of the Indian archipelago, has the same characters as that of the preceding genera, with four or five sepals and a diplostemonous andrœcium, and a fleshy fruit; but in each of the cells of the inferior ovary there are four descending ovules, disposed in pairs; and in the cymes there are no connate bracteoles to form a sort of calicule. In *Pellacalyx*, native of the same regions, the ovary, entirely inferior, is surmounted by a receptacular tube at the summit of which are inserted from four to six sepals, an equal number of alternate petals (little developed or nil) and a double number of stamens arranged in two verticils. The ovarian cells enclose numerous descending ovules.

III. MACARISIA SERIES.

For a long time referred to other families, *Macarisia*[3] (fig. 270, 271) is the best type of this group to which the names of *Legnotideæ* and *Cassipoureæ* have been given. The flowers are regular, with a receptacle in the form of a shallow cup, bearing on its margin five valvate and slightly reduplicate sepals, and five alternate petals, spoon-shaped at the base, with a limb divided into unequal lobes.[1] The perigynous stamens are inserted on the receptacle within the petals; they are formed each of a free filament and an introrse bilocular anther, dehiscing by two longitudinal clefts, inflexed in the bud. Five are superposed to the petals, and five, somewhat shorter, alternate; they are separated from each other by an equal number of tongues belonging to the disk. The gynæcium, somewhat restricted at the base, is inserted at the bottom of the receptacular cup, but entirely free. It is composed of an ovary with five cells,[2] superposed to the petals, surmounted by a style slightly capitate and stigmatiferous at the summit. In the internal angle of each cell is found a placenta supporting two collateral, descending, incompletely anatropous ovules, with micropyle exterior and superior. The fruit is a loculicidal capsule finally dividing above into ten pannels and setting free ten (or less) compressed seeds, surmounted by a long vertical membranous wing, and enclosing, in the centre of a fleshy albumen, an elongate embryo, with oblong cotyledons and superior radicle. *Macarisia* consists of shrubs from Madagascar. The leaves are opposite, petiolate, accompanied by interpetiolate stipules, with entire or dentelate, penninerved limb. The flowers, in the axil of the leaves, are in compound cymes, with articulate pedicels accompanied by two lateral bracteoles. Two species[3] are known.

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[1] Wight, *Ill.* i. t. 90; *Icon.* t. 604, 605 (*Carallia*).—Arn. *Ann. Nat. Hist.* i. 370 (*Carallia*). —Thw. *Enum. Pl. Zeyl.* 120 (*Carallia*) —Tul. *Ann. Sc. Nat.* sér. 4, vi. 116 (*Carallia*).—Benth. *Fl. Hongk.* 110; *Fl. Austral.* ii. 495 (*Carallia*). —Miq. *Fl. Ind.-Bat.* i. p. i. 593; Suppl. 126, 326 (*Carallia*).—Rheede, *Hort. Malab.* v. t. 13. —Walp. *Rep.* ii. 71; *Ann.* vii. 951 (*Carallia*).

[2] Small, greenish or whitish, accompanied by two lateral bracteoles.

[3] *Hist. Vég. Isl. Afr.* 49, t. 14.—Endl. *Gen.* n. 6890 (*Macharisia*).—H. Bn. *Adansonia*, iii. 15, 19, t. 2.—B. H. *Gen.* 246, 682, n. 12.

Macarisia lanceolata.

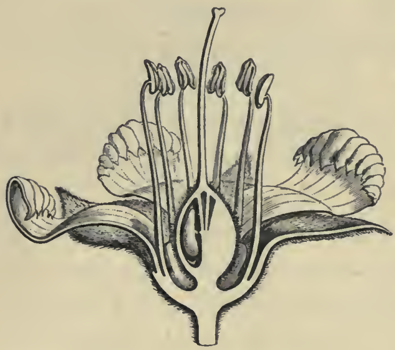

Fig. 270. Long. sect. of flower ($\frac{4}{1}$).

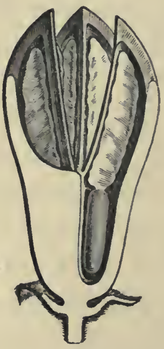

Fig. 271. Long. sect. of fruit.

Cassipourea (fig. 272–274) comprises plants from tropical America, the flower of which is nearly the same in construction as that of

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[1] Imbricate between them.

[2] Somewhat incomplete above the ovules.

[3] H. Bn. *loc. cit.* 20. — Walp. *Ann.* vii. 952.

Macarisia, but a little more complicated. The petals, four or five in number, are spathulate and deeply laciniate, and the stamens are from fifteen to thirty in number. In the ovary, constricted at the base, are found three or four biovulate cells; and the fruit, spherical or ovoid, thick and more or less fleshy, finally opens along the partitions. The albuminous seeds are more or less angular but not winged. In the old world *Cassipourea* has its analogues in three genera scarcely distinct. They are: *Dactylopetalum*, native of tropical western Africa and Madagascar, having pentamerous flowers with ten or fifteen stamens, and an ovary with two or three incomplete cells; *Blepharistemma*, an Indian shrub, having the tetramerous and diplostemonous flower of *Cassipourea*, with an ovary of three biovulate cells; and *Weihea*, inhabiting Ceylon and the same regions as *Dactylopetalum*, having the andrœcium of *Cassipourea*, but an ovary inserted at the bottom of the receptacle by a wide base, more or less adnate, and flowers, solitary or grouped in cymes more or less compound, accompanied by two connate bracteoles forming a sort of calicule.

Cassipourea elliptica.

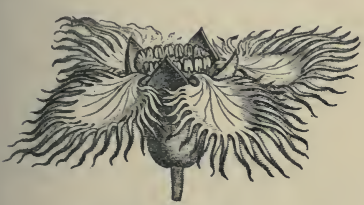

Fig. 272. Flower.

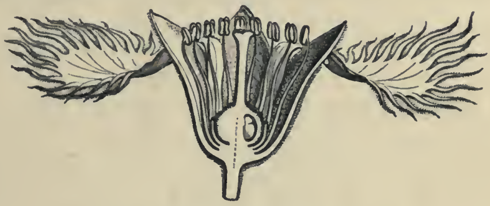

Fig. 273. Long. sect. of flower.

Cassipourea elliptica.

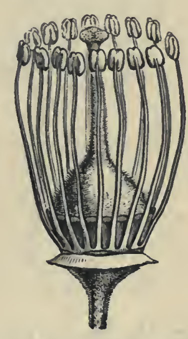

Fig. 274. Flower with perianth removed.

IV. ANISOPHYLLEA SERIES.

In this genus, which has been referred to very different families,[1] and which owes its name[2] to the singular peculiarity presented by its leaves, the flowers are polygamous (fig. 275, 276) and have a receptacle varying much in shape according as they include the two sexes or are only males. That is, when they are hermaphrodite or female, the ovary is lodged in a tubular, obconical or ovoid pouch, forming its receptacular cavity, which disappears when there is no gynæcium to envelop. The epigynous calyx is formed of four tolerably thick triangular, valvate sepals, and the corolla, of the same number of alternate petals. The latter are often thick and fleshy, sometimes small and entire, or very slightly sloped at the summit, bilobed or divided into a variable number of unequal lobes. The andrœcium is diplostemonous, and its eight pieces, superposed, four to the sepals, and four to the petals, are alternate with an equal number of lobes of the epigynous disk. They are formed each of a free subulate filament, thickened and often compressed towards the base, and of an introrse, bilocular anther, dehiscing by two longitudinal clefts, which may be reduced to a small sterile mass, of glandular appearance, in the oppositipetalous

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[1] The *Hamamelideæ*, *Cunonieæ*, etc.

[2] *Anisophyllea* R. Br. *Trans. Hort. Soc.* v. 446. —H. Bn. *Payer Fam. Nat.* 361.—Oliv. *Trans. Linn. Soc.* xxiii. 460.—B. H. *Gen.* 683, n. 16.—

Anisophyllea disticha.

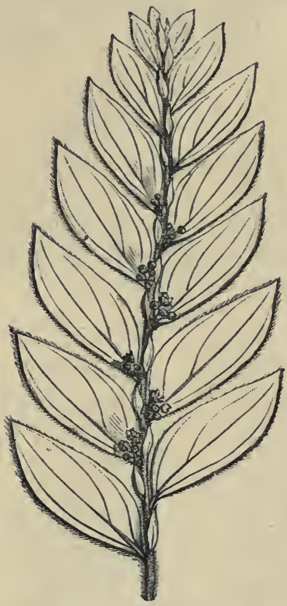

Fig. 275. Floriferous branch.

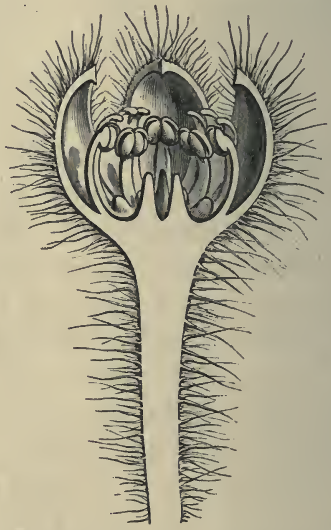

Fig. 276. Long. sect. of male flower ($\frac{1}{20}$).

Anisophyllum Don, ex *Hook. Niger Fl.* 342, 575 (not Haw.).—Benth. *Journ. Linn. Soc.* iii. 72. —H. Bn. *Adansonia,* iii. 22, 36.—*Tetracrypta* Gardn. et Champ. *Hook. Kew Journ.* i. 314.— Hook. *Fl. Ind.* ii. 441.

stamens, or even disappear altogether. In the internal angle of each ovarian cell, there is a descending anatropous ovule with micropyle superior and exterior. The fruit, surmounted by the calyx or its scar, is oblong, slightly fleshy or coriaceous, with smooth surface, or traversed by longitudinal ribs,[1] and encloses a descending seed the coats of which cover a fleshy macropodal embryo, with a superior radicle, in the form of a thick club and with a gemmule formed of a goodly number of small leaves in two vertical series. *Anisophyllea*, of which seven or eight species[2] are known, consists of trees or shrubs mostly from the tropical regions of the old world; they have been observed in India, Malaya, Madagascar, and tropical western Africa. The leaves are alternate, distichous, without stipules, alternately small and reduced to stipuliform tongues, and large, oval or lanceolate, sometimes oblique at the base (giving them the form of a parallelogram or trapezium), entire, coriaceous, in dried specimens often presenting a yellow tinge, penninerved and regularly or irregularly 3–7-nerved at the base. The flowers are axillary (fig. 275), small and disposed in simple spikes, with or without bracteoles.

The different groups united in this small family should have been placed far from each other, and they have been, in fact, when the principles of A. L. DE JUSSIEU have been strictly applied. The *Cassipoureæ* known were, clearly, plants evidently epigynous, while the true *Rhizophoreæ* and *Carallia* had an ovary in great part inferior, with perigynous or epigynous stamens. It was R. BROWN,[3] who, in 1814, gave the name of *Rhizophora* to a distinct family,[4] before him referred to the *Caprifolieæ*. In 1846 LINDLEY[5] placed the *Cassipoureæ* after the *Loganiaceæ*, although he was not ignorant of their affinities with the Mangroves pointed out by R. BROWN. *Anisophyllea*, on the other hand, has been considered a neighbour of the *Saxifragaceæ*. ENDLICHER,[6] nevertheless, in 1840, restored the *Cassipoureæ* to the *Rhizophoreæ*;[1] according to him as also to LINDLEY, it was only the genus *Crossostylis* of FORSTER that ought to be transferred to another family, that of *Myrtaceæ*. After many labours, particularly by BLUME, ARNOTT, KORTHALS, and A. GRAY, the *Cassipoureæ*, considered as a tribe of the *Rhizophoraceæ* were, in 1858, the subject of a special memoir by MR. BENTHAM,[2] who reunited in this group the nine genera *Carallia*, *Pellacalyx*, *Haplopetalum*, *Gynotroches*, *Crossostylis*, *Anstrutheria*, *Blepharistemma*, *Dactylopetalum*, and *Cassipourea*. The *Rhizophoreæ*, on the other hand, after the labours of WIGHT and ARNOTT,[3] comprised the four genera *Rhizophora*, *Bruguiera*, *Ceriops*, and *Kandelia*. In 1862 we[4] recognized that the genus *Macarisia* of DUPETIT-THOUARS, referred to various families, in particular to the *Rhamnaceæ*, to the *Meliaceæ*, to the *Linaceæ*,[5] was allied to *Cassipourea*; that *Anisophyllea* presented closer floral analogies to *Carallia*; that *Anstrutheria* belonged to the old genus *Weihea* of SPRENGEL, and that certain species of *Crossostylis*[6] did not differ generically from *Haplopetalum* of A. GRAY. At present we do not think it possible to refer *Plæsiantha* of J. D. HOOKER to the genus *Pellacalyx* as an apetalous type, and we restore to *Carallia* its primitive name of *Barraldeia*, which dates from 1806. Consequently, we provisionally retain in this family only fourteen genera, distributed in four series in the following manner:

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[1] In *Combretocarpus Motleyi* HOOK. F. (*Gen.* 683, n. 17), a small tree of Borneo, these ribs are more prominent and developed into three or four vertical wings, at the same time the staminal filaments are narrower than in *Anisophyllea* from which *Combretocarpus* is not perhaps generically distinct.

[2] JACK, *Mal. Misc.*; *Calc. Journn.* iv. 336 (*Haloragis*).—MIQ. *Fl. Ind.-Bat.* i. p. i. 596 (*Anisophyllum*).—THW. *Hook. Journ.* v. 378, t. 5 (*Tetracrypta*); *Enum. Fl. Zeyl.* 119.—OLIV. *Fl. Trop. Afr.* ii. 412.—H. BN. *Adansonia*, xi. 310.—WALP. *Ann.* ii. 530 (*Anisophyllum*).

[3] *Flind. Voy.* ii. 549; *Congo*, 437.

[4] Already in 1796, SAVIGNY (*Lamk. Dict.* iv. 696) had formed a distinct family under the name of *Palétuviers*.

[5] *Veg. Kingd.* 604.

[6] *Gen.* 1186 (*Legnotideæ*).

I. RHIZOPHOREÆ.—Receptacle concave and ovary partly or entirely inferior. Style simple. Seed exalbuminous, with macropod embryo, germinating in the fruit and on the tree.—Trees of the sea coast; leaves opposite, entire, with interpetiolate stipules.—4 genera.

II. BARRALDIEÆ.—Receptacle concave and ovary partly or entirely inferior. Style simple. Seed furnished with albumen surrounding the embryo which does not germinate in the fruit.—Trees and shrubs; leaves opposite, generally entire, with interpetiolate stipules.—4 genera.

III. MACARISIEÆ.[7]—Receptacle concave or convex and ovary free sessile or shortly stipitate. Seed albuminous arillate or winged.—

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[1] *Op. cit.* 1184, Ord. 263.—DC. *Prodr.* iii. 31. —*Rhizophoraceæ* LINDL. *op. cit.* 726, Ord. 279.

[2] Synopsis of *Legnotideæ*, a tribe of *Rhizophoraceæ* (*Journ. Linn. Soc.* iii. 65).

[3] *Ann. Nat. Hist.* i. 359.

[4] *Adansonia*, iii. 15.

[5] PL. ex B. H. *Gen.* 246.

[6] Notably *C. multiflora*, AD. BR. et GR. a new Caledonian species.

[7] *Legnotideæ* BARTL. *Ord. Nat.*—ENDL. *Gen.* 1186.—*Cassipoureæ* MEISSN. *Gen.* 119.—LINDL. *Veg. Kingd.* (1846) 604.—J. G. AG. *Theor. Syst. Plant.* 246.

Trees and shrubs; leaves opposite, entire or dentelate, with interpetiolate stipules.—5 genera.

IV. ANISOPHYLLEÆ.[1] — Receptacle concave and ovary inferior. Styles distinct. Flowers polygamous. Seed exalbuminous, with macropod embryo. Shrubs with alternate leaves or alternately large and very small. Flowers in spikes or axillary clusters.—1 genus.

These fourteen genera comprise some fifty species, all of which, except one *Rhizophora* and two or three *Cassipoureas*, belong to the old world. All the species of *Crossostylis* are Oceanic. *Macarisia* is found only in Madagascar, and *Dactylopetalum* belongs exclusively to that island and western tropical Africa. *Weihea* belongs to the same regions except one species which inhabits Ceylon. *Blepharistemma* is Indian, as likewise *Kandelia*. *Pellacalyx* and *Gynotroches* belong to Malaya. *Anisophyllea* has been observed in Asia and tropical Oceania, in Madagascar and the west of tropical Africa; *Barraldeia* in Madagascar, Asia, and tropical Oceania. The genera of the Mangrove series are formed of species all of which, except *Rhizophora Mangle*, grow abundantly on all the tropical maritime shores of the old world. They are the most common and best known among many plants of very different families growing with them and in the same manner on flooded coasts, such as *Avicennia*, *Ægiceras*, *Conocarpus*, *Lumnitzera*, etc., which, sending down into the mud their numerous long adventitious roots that support their stems, constitute aquatic forests,[2] often very dense, affording shelter to crowds of marine animals, and considered in most tropical countries as dangerous sources of miasmatic affections.

These plants have manifold affinities; on the one hand with certain families with free gynæcium, as the *Macarisiæ*, and on the other hand with groups, as *Rhizophora*, in which the ovary is inferior and adnate to the cavity of the receptacle. This is precisely the case with the *Loranthea*, *Onagrariæ*, and *Cornaceæ*, to which they were formerly referred or compared, but are distinguished: the first by their simple perianth and the organization of their gynæcium; the last by a great number of traits, but chiefly that their ovules, when they are descending and definite in number, have the micropyle interior, and not exterior like that of the *Rhizophoraceæ*. By their opposite leaves and inferior ovary, these last are near neighbours of the *Myrtaceæ*, from which they are separated by their stipules and by the generally definite number of their stamens and ovules. The latter, moreover, are always descending, with the micropyle exterior. This character recurs in the *Araliaceæ*, the flower of which, analogous to that of the *Rhizophoreæ* in the form of the receptacle, and the thick corolla, often valvate, has an andrœcium nearly always isostemonous, inserted below an epigynous disk, whilst the seeds have a small embryo situate near the summit of an abundant albumen, and the leaves are generally alternate and often compound. The genera of *Rhizophoraceæ* with free ovary,[1] whilst the receptacle is more or less concave, approach the *Lythrariaceæ*, of which they often present the habit, the inflorescence, the simple style, but have generally neither interpetiolate stipules, nor punctate leaves, nor independent disk prominent in its upper part, nor thick and valvate petals, nor albumen in the seeds. The *Rhizophoraceæ* have also been considered as allied to the *Saxifragaceæ*, especially to the *Hamamelideæ*, among which the genus *Anisophyllea* has been placed, and to the *Cunonieæ* with opposite leaves. But this affinity appears to us distant; it can hardly be claimed for genera with parietal placentæ, independant styles, numerous and not voluminous ovules, inserted on a salient or descending and more or less bilobed placenta. To sum up, the *Rhizophoraceæ* appear to us neighbours of the *Myrtaceæ*, of the *Lythrariaceæ*, and of the *Cornaceæ*, but it is always easy to distinguish them.

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[1] *Anisophylleæ* B. H. *Gen.* 678.

[2] "Regionem peculiarem formant." (ENDL.)

USES.[2]—These are not numerous. The plants are generally astringent, tolerably rich in tannin, and consequently sometimes employed by dyers and tanners. This is the case with *Rhizophora mangle*[3] (fig. 253–260). Its bark is used in tropical America to dye black and brown. It is employed medicinally in the treatment of flux, hemorrhage, and angina. The fruit is said to be edible, and a sort of fermented wine is prepared from it. In Brazil and Columbia, a reddish juice is obtained from incisions made in the trunk which, dried in the sun, constitutes a kind of false dragon's blood, not unfrequently brought to Europe as American kino and having the same astringent qualities as that of India.[1] The wood[2] of this species is tolerably hard and durable. Several Mangroves of the old world (many of which are scarcely specifically distinct) have quite analogous properties, particularly *R. apiculata* and *mucronata*.[3] The *Bruguieras* of India, chiefly *B. gymnorhiza*[4] (fig. 261–263) and *B. Rheedii*, *Rumphii*, *cylindrica*, *parviflora*, have the same uses. *Kandelia Rheedii*[5] is also employed as an astringent medicine. The leaves of several Indian *Barraldeias*, among others *B. corymbosa* and *integerrima*[6] (fig. 264–269), are used in the treatment of ulcers in the mouth and throat. At Sierra Leone, the fruit of *Anisophyllea laurina*[7] is sold in the markets in spring; it is about the size of a pigeon's egg and edible. Except *Barraldeia*, the plants of this group are rarely seen in our conservatories. *Rhizophora* grows with difficulty and ordinarily attains but little development.

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[1] LINDLEY places, I know not why, the *Cassipoureæ* beside the *Loganiaceæ*.

[2] ENDL. *Enchirid.* 634.—LINDL. *Veg. Kingd.* (1846) 727.—ROSENTH. *Syn. Pl. Diaphor.* 904, 1157.

[3] L. *Spec.* 634.—JACQ. *Amer.* 141, t. 89.—CATESB. *Carol.* ii. t. 53.—DC. *Prodr.* iii. 32, n. 1 (*Manglier noir*, *Palétuvier noir*). Its fruit is vulgarly called *Mange* or *Mangle*.

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[1] Guib. *Drog. Simpl.* éd. 6, iii. 434.

[2] Vulg. *Horse-flesh.*

[3] Lamk. *Dict.* vi. 169; *Ill.* t. 396, fig. 2.—*R. candelaria* Wight and Arn. *Prodr.* i. 310 (not DC.). — *Mangium candelarium* Rumph. *Herb. Amboin.* iii. 108. t. 71, 72 (ex Bl.). The seeds of this species and of some others are not unfrequently used as a masticatory instead of catechu powder, and for this purpose are mixed with betel. In India and the Moluccas cords are rubbed with Mangrove leaves to render them more durable.

[4] Lamk. *Ill.* t. 397.—*R. gymnorhiza* L. *Spec.* 634.—DC. *Prodr.* n. 10 (*Palétuvier des Indes*).

[5] See p. 303, note 8. Its bark is febrifuge. Fishermen apply it as a remedy for the bite of certain fishes and other venomous animals. Its fruit is edible, and its wood is used for boat-making.

[6] *Carallia integerrima* DC. *Prodr.* iii. 33.—*C. zeylanica* Arn. *Ann. Nat. Hist.* i. 371.—*C. corymbosa* Arn. *loc. cit.*—*C. sinensis* Arn. *loc. cit.* —*C. timorensis* Bl.—*C. octopetala* F. Muell.—*Pootsia coreopsifolia* Miq.

[7] R. Br. *Trans. Hort. Soc.* v. 446.—Oliv. *Fl. Trop. Afr.* ii. 413. — *Anisophyllum laurinum* Don.—Benth. *Niger*, 342 (*Monkey Apple*).

GENERA.

I. RHIZOPHOREÆ.

1. **Rhizophora** L.—Flowers regular; receptacle concave obconical. Sepals 4, inserted in margin of receptacle, coriaceous, valvate. Petals 4, alternate, valvate. Stamens 8, 4 oppositipetalous, longer (or more rarely 12); filaments perigynous with perianth, short or subnil; anthers elongate pointed finally 2-valvate; furrows of anthers lateral or subintrorse, sometimes incomplete; cells areolate-multilocellate. Germen semi-inferior, 2-locular, at vertex produced to a cone; style subulate, often short, at apex stigmatose 2-dentate. Ovules in cells 2-nate, collaterally descending; micropyle extrorsely superior. Fruit girt below the middle with reflexed persistent calyx, coriaceous, indehiscent. Seed 1, descending; cotyledons of exalbuminous embryo conferruminate; radicle perforating the apex of the seed germinating within the fruit while remaining on the tree and of the pericarp, elongately clavate and seeking the mud. Trees and shrubs oftener glabrous; branches thick cicatrized; leaves opposite, petiolate, coriaceous entire glabrous; stipules interpetiolate, caducous; flowers in axillary pedunculate, ramosely 2–3-chotomous cymes; pedicel girt at base with lateral bracteoles connate in a cupule. (*All trop. shores.*)—See p. 287.

2. **Ceriops** Arn.[1]—Flowers nearly of *Rhizophora*,[2] 5–6-merous; petals[3] inserted at base of fleshy 10–12-lobed disk. Stamens 10–12; those opposite petals longer;[4] filaments slender, alternating with

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[1] *Ann. Nat. Hist.* i. 363.—Endl. *Gen.* n. 6099.—H. Bn. *Adansonia* iii. 33.—B. H. *Gen.* 679, n. 2.—Hook. *Fl. Ind.* ii. 436.

[2] Generally much smaller.

[3] Emarginate; lobes setulose clavate appendiculate.

[4] Petals finally 2-nately opposite (for the reason of which see *Bull. Soc. Linn. Par.* 58).

lobes of disk; anthers oblong. Germen semi-inferior, 2–3-locular; cells 2-ovulate; style at apex simple subulate. Fruit, etc., of *Rhizophora*; seed germinating as in *Rhizophora.*—Trees; opposite leaves and stipules of *Rhizophora*; flowers subcapitate, 2–3-chotomously cymoso-glomerulate. (*Trop. Asia, Africa, and Oceania.*[1])

3. **Bruguiera** Lamk.[2]—Flowers nearly of *Rhizophora*, 8–14-merous; petals setiferous, 2-lobed and each enfolding a pair of stamens.[3] Stamens 16–28; filaments finally elastically resilient from petals; anthers introrse linear-oblong. Germen inferior, 2–4-locular; style at apex minutely 2–4-fid; ovules, etc., of *Rhizophora*. Fruit turbinate, crowned with accrescent calyx; seed germinating as in *Rhizophora.*—Trees; leaves and stipules of *Rhizophora*; flowers[4] axillary solitary or cymose few, nutant. (*Trop. shores of Asia, Africa, and Oceania.*[5])

4. **Kandelia** Wight and Arn.[6]—Flowers nearly of *Rhizophora*, 5–6-merous; stamens ∞; filaments capillary; anthers oblong. Germen sub-1-locular; ovules 6, inserted 2-nately on columnar placenta (in 1-locular ovary), descending; style at apex 3-fid. Other characters of *Rhizophora.*—Small trees; opposite leaves and interpetiolate stipules of *Rhizophora*; flowers[7] cymose pedunculate axillary few. (*East Indian shores.*[8])

II. BARRALDEIEÆ.

5. **Barraldeia** Dup.-Th.—Flowers hermaphrodite; receptacle very concave. Sepals 4–8, inserted in margin, valvate. Petals same in

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[1] Spec. 1, 2. Wight, *Icon.* t. 240.—Miq. *Fl. Ind.-Bat.* i. p. i. 590; Suppl. 126, 324.—Benth. *Fl. Hongk.* 120; *Fl. Austral.* ii. 493.—Thw. *Enum. Pl. Zeyl.* 120.—Tul. *Ann. Sc. Nat.* sér. 4, vi. 111.—Oliv. *Fl. Trop. Afr.* ii. 408.—Walp. *Rep.* ii. 70: *Ann.* ii. 527; vii. 950.

[2] *Dict.* iv. 696; *Ill.* t. 397.—Endl. *Gen.* n. 6101.—H. Bn. *Payer Fam. Nat.* 300.—B. H. *Gen.* 679, n. 4.—Hook. *Fl. Ind.* ii. 437.—*Kanilia* Bl. *Mus. Lugd.-Bat.* i. 140.—*Palétuveria* Dup.-Th. (ex Endl.).

[3] The alternipetalous stamen generally shorter and in adult flowers only interior to petal.

[4] Rather large or small, articulate.

[5] Spec. 5, 6. Gærtn. *Fruct.* i. 213, t. 45, fig. 2 (*Rhizophora*). — DC. *Prodr.* iii. 32, n. 9, 10 (*Rhizophora*).—Griff. *Ic.* iv. t. 641.—Hook. *Ic.* t. 397, 398.—Wight, *Ic.* t. 239.—Arn. *Ann. Nat. Hist.* i. 365.—Miq. *Fl. Ind.-Bat.* i. p. i. 585; Suppl. 126, 324.—Tul. *Ann. Sc. Nat.* sér. 4, vi. 113.—Benth. *Fl. Austral.* ii. 494.—Harv. and Sond. *Fl. Cap.* ii. 514.—Thw. *Enum. Pl. Zeyl.* 120.—Oliv. *Fl. Trop. Afr.* ii. 409.—Walp. *Rep.* ii. 70; *Ann.* ii. 528; vii. 951.

[6] *Prodr.* i. 310.—Arn. *Ann. Nat. Hist.* i. 365.—Endl. *Gen.* n. 6100.—H. Bn. *Payer Fam. Nat.* 361.—B. H. *Gen.* 679, n. 3.—Hook. *Fl. Ind.* ii. 237.

[7] Petals multifid-lacerate, white, rather large.

[8] Spec. 1. *K. Rheedii* Wight and Arn. *op. cit.* 311.—Wight, *Ill.* i. t. 89.—Benth. *Fl. Hongk.* 110.—Miq. *Fl. Ind.-Bat.* i. p. i. 585.—Hook. *Icon.* t. 362.—*Rhizophora Kandel* L. *Spec.* 634.—DC. *Prodr.* iii. 32.— *Tsjerou Kandel* Rheed. *Hort. Malab.* vi. t. 35.

number, subentire or 2-fid, serrate or lacerate. Stamens double in number, inserted in 2 series under epigynous simple or 2-plicate, 8–16-lobed disk projecting between the filaments and free; anthers introrsely 2-rimose. Germen partly or quite inferior; cells 3–6; style at stigmatose apex variously 3–6-lobed. Ovules in cells 2, descending; micropyle extrorse. Fruit generally crowned with calyx, globular coriaceous. Seed globular or reniform; albumen fleshy; radicle of axile more or less incurved embryo superior.—Glabrous trees or shrubs; leaves opposite petiolate glabrous, entire or serrulate; stipules interpetiolate, caducous; flowers small in compound cymes; pedicels articulate, minutely 2-bracteolate. (*Asia, trop. Oceania, Malacca.*)—See p. 291.

6. **Crossostylis** Forst.[1]—Flowers nearly of *Barraldeia*; receptacle shortly obconical or obpyramidal. Sepals 4, 5, 3-angular, valvate. Petals same in number lacerate or more rarely subentire (*Haplopetalum*[2]). Stamens 8–10, or oftener 12–∞,[3] alternating with as many lobes of disk;[4] anthers introrse. Germen adnate to receptacle at base, thence free; style at stigmatose apex funnel-shaped and there reflexed ∞-lobed. Ovules in cells 4-∞ (very incomplete) 2-nate, inserted in pairs on central column[5] descending; micropyle extrorsely superior. Fruit scarcely or to a less or greater extent adnate to receptacle and crowned with calyx, scarcely or tardily septicidal. Seeds ∞, furnished with a fleshy aril; albumen fleshy; cotyledons of oftener straight embryo[6] narrowly ovate.—Small trees or shrubs; leaves opposite; stipules, etc., of *Barraldeia*; flowers[7] axillary pedunculate, 2-nate or cymose ∞. (*Oceania.*[8])

7. **Gynotroches** Bl.[9]—Flowers nearly of *Barraldeia*, 4–5-merous. Stamens 8–10, inserted at margin of disk; anthers small sub-2-dymous. Germen partly inferior; cells 4–6; style depressed-

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[1] *Char. Gen.* 87, t. 44.—J. *Gen.* 432.—Lamk. *Dict.* ii. 193.—DC. *Prodr.* iii. 296.—Endl. *Gen.* n. 6336.—Benth. *Journ. Linn. Soc.* iii. 77.—H. Bn. *Adansonia*, iii. 31, 40; *Payer Fam. Nat.* 361.—B. H. *Gen.* 681, n. 10.—*Tomostyles* Montrous. *Mém. Acad. Lyon.* x. 201.

[2] A. Gray, *Unit. St. Expl. Exp. Bot.* i. 608, t. 76; *Seem. Bonpl.* (1862) 36.—Benth. *Journ. Linn. Soc.* iii. 76.—H. Bn. *Adansonia*, iii. 29.

[3] Of which 4, 5, larger, oppositipetalous; the rest from the middle of the petal to the margin smaller; the smallest often oppositipetalous.

[4] Often regarded as staminodes.

[5] Bearing rudiments of septa generally little prominent or inconspicuous.

[6] Sometimes green.

[7] Large or minute, white.

[8] Spec. about 5. Guillem. *Ann. Sc. Nat.* sér. 2, vii. 354.—A. Gray, *loc. cit.* 610, t. 77.—Seem. *Fl. Vit.* 428.—Br. et Gr. *Bull. Soc. Bot. Fr.* viii. 376; *Ann. Sc. Nat.* sér. 5, xiii. 393.

[9] *Bijdr.* 218; *Mus. Lugd.-Bat.* i. 126, t. 31.—Benth. *Journ. Linn. Soc.* iii. 76.—H. Bn. *Adansonia*, iii. 30, 40; *Payer Fam. Nat.* 362.—B. H. *Gen.* 681, n. 9.—Hook. *Fl. Ind.* ii. 440.—*Dryptopetalum* Arn. *Ann. Nat. Hist.* i. 372.—Endl. *Gen.* n. 6103.

capitate. Ovules in cells 4, 2-seriate, descending.[1] Fruit baccate, ∞-spermous; seeds, etc., of *Barraldeia.*—Trees or shrubs; leaves opposite; stipules interpetiolate, caducous; flowers[2] axillary cymose, articulate, ebracteolate. (*Indian Archipelago.*[3])

8. **Pellacalyx** Korth.[4]—Flowers ebracteolate; receptacle tubular or subcampanulate, produced beyond adnate germen and lined with tubular disk. Sepals 4–6, inserted at top of tube, small, 3-angular, valvate, recurved. Petals small, inserted between sepals, at apex slightly lacerate,[5] or sometimes 0 (*Plœsiantha*[6]). Stamens twice as many as petals, inserted in 2 series under apex of tube. Germen inferior; cells 6–10, complete or incomplete; style erect, at apex capitate-disciform. Ovules in cells ∞. Fruit fleshy; seeds ∞, albuminous.[7]—Small trees; leaves opposite petiolate, oblong entire or serrulate; stipules caducous; flowers axillary solitary or glomerulate. (*Indian Archipelago.*[8])

III. MACARISIEÆ.

9. **Macarisia** Dup.-Th.—Flowers hermaphrodite; receptacle cupular, lined with disk. Sepals 5, marginally inserted, 3-angular, valvate, reflexed. Petals 5, inserted under 10-dentate disk; lobes unequal involute. Stamens 10, 2-seriate, alternating with teeth of disk; anthers introrse, 2-rimose. Germen inserted at bottom of receptacle, shortly stipitate, free, 5-locular; cells oppositipetalous, incomplete above; style capitellate at apex. Ovules in cells 2, collaterally descending; micropyle extrorsely superior. Fruit capsular, girt at base with scarcely increased receptacle, oblong-5-angular, loculicidally 5-valvate or incompletely 10-valvate. Seeds in cells 2, descending; testa produced above to a wing; albumen fleshy; cotyledons of elongate embryo oblong; radicle superior.—Small trees; leaves opposite petiolate, oblong-lanceolate entire or denticulate;

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[1] The upper younger.

[2] Small, "greenish yellow," articulate.

[3] Spec. 2. Wall. *Cat.* n. 4338 (*Microtropis*).—Miq. *Fl. Ind.-Bat.* i. p. i. 592; Suppl. 1-6, 326; *Ann. Mus. Lugd.-Bat.* ii. 67.—Walp. *Ann.* vii. 951.

[4] *Ned. Tijdschr.* iii. 20, t. 2.—Griff. *Notul.* iv. 429, t. 486.—Benth. *Journ. Linn. Soc.* iii. 75.—H. Bn. *Adansonia*, iii. 31.—B. H. *Gen.* 680, n. 6.—Hook. *Fl. Ind.* ii. 440.

[5] Sect. *Eupellacalyx*.

[6] Hook. f. *Gen.* 681, n. 8.

[7] Embryo elongate, greenish.

[8] Spec. 2. Miq. *Fl. Ind.-Bat.* Suppl. 126, 325; *Ann. Mus. Lugd.-Bat.* ii. 67.—Walp. *Ann.* vii. 251.

stipules interpetiolate; flowers axillary compound-cymose; pedicels articulate, 2-bracteolate. (*Madagascar.*)—See p. 293.

10. **Cassipourea** Aubl.[1]—Flowers nearly of *Macarisia*, 4–5-merous. Stamens[2] 15–30, inserted at margin of disk; disk, etc., of *Macarisia.* Germen very shortly stipitate or subsessile; cells 3, 4, 2-ovulate.[3] Fruit fleshy or suberose, tardily septicidal. Seed arillate;[4] embryo albuminous.[5]—Glabrous trees or shrubs; leaves opposite, entire or crenulate, penninerved; stipules interpetiolate, caducous; flowers[6] axillary cymose or solitary. (*Trop. centr. America.*[7])

11. **Dactylopetalum** Benth.[8]—Flowers nearly of *Cassipourea*, 5–6-merous; calyx dentate. Petals at base long narrow, lacerate at apex. Stamens 10, 2-seriate; the oppositipetalous longer; or 15, inserted under the crenatures of the disk[9] lining the receptacle; filaments inflexed in bud or 2-plicate; anthers introrse versatile. Germen more or less completely 2–3-locular;[10] ovules in cells 2; obturator thick. Fruit . . . ?—Small trees or shrubs; leaves opposite entire coriaceous; stipules small, caducous; flowers[11] axillary cymose or glomerulate, sometimes very crowded, articulate. Other characters of *Cassipourea.* (*Trop. west. Africa, Madagascar.*[12])

12? **Blepharistemma** Wall.[13]—"Flowers polygamo-diœcious (nearly of *Cassipourea*), 4-merous; calyx valvate. Petals 4, lacerate, and stamens 8 (of *Cassipourea*). Germen free, contracted at base, 3-locular; ovules in cells 2 and other characters of *Cassipourea.*—A shrub (?); leaves opposite petiolate sinuately crenate penninerved; stipules interpetiolate, caducous; cymes axillary shortly pedunculate, ∞-florous." (*East India.*[14])

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[1] *Guian.* i. 529, t. 211.—J. *Gen.* 432.—Lamk. *Dict.* i. 653.—DC. *Prodr.* iii. 33.—Endl. *Gen.* n. 6104.—Benth. *Journ. Linn. Soc.* iii. 79.—H. Bn. *Adansonia,* iii. 25, 38; *Payer Fam. Nat.* 362.—B. H. *Gen.* 682, n. 15.—*Tita* Scop. *Introd.* n. 967.—*Legnotis* Sw. *Prodr.* 84; *Fl. Ind. Occ.* 968, t. 17.

[2] Exterior to cupular disk.

[3] Obturator rather thick above micropyle.

[4] Lobes laterally produced to aril.

[5] Sometimes coloured.

[6] Small or rather large, white.

[7] Spec. 2, 3. Poir. *Dict.* Suppl. ii. 131.—Hook. *Icon.* t. 280.—Griseb. *Fl. Brit. W.-Ind.* 274.

[8] *Journ. Linn. Soc.* iii. 79.—H. Bn. *Adansonia,* iii. 21, 35.—B. H. *Gen.* 682, n. 14.

[9] Lobes of disk oftener in pairs interior to smaller stamens; or filaments sometimes at base continuous with margins of disk.

[10] Style sometimes tubular, thicker at apex.

[11] Whitish.

[12] Spec. about 3. Tul. *Ann. Sc. Nat.* sér. 4, vi. 123, n. 6 (*Cassipourea*).—Oliv. *Fl. Trop. Afr.* ii. 411.—H. Bn. *Adans.* xi. 374.

[13] *Cat.* n. 6320.—Benth. *Journ. Linn. Soc.* iii. 78.—B. H. *Gen.* 684, n. 13.—Hook. *Fl. Ind.* ii. 441.

[14] Spec. 1. *B. corymbosum,* Wall.—*Dryptopetalum membranaceum,* Miq. exs. *Hohen.* n. 713.

13? **Weihea** Spreng.[1]—Flowers nearly of *Cassipourea*, 4–6-merous; stamens 15–30. Germen at broad base internally adnate to receptacle; cells 3, 4, 2-ovulate.[2] Fruit tardily septicidal.[3] Seeds[4] albuminous, embryo, etc., of *Cassipourea.*—Trees or shrubs; leaves opposite, entire or serrulate; flowers axillary, solitary or cymose 3–∞.[5] Other characters of *Cassipourea.*[6] (*Ceylon, trop. west. Africa, Madagascar.*[7])

IV. ANISOPHYLLEÆ.

14. **Anisophyllea** R. Br.—Flowers polygamous; receptacle concave tubular. Calyx epigynous; folioles 4, valvate, finally erect. Petals 4, alternate, inserted with sepals, entire or emarginate, oftener 2-lobed or lacerate. Stamens 8, 2-seriate and alternating with glands of epigynous disk; filaments subulate compressed; anthers often 2-dymous, 2-rimose within, sometimes in oppositipetalous stamens glanduliform (or 0). Germen 4-locular; cells oppositipetalous, 1-ovulate; styles 4, distinct, recurved at apex. Ovule descending; micropyle extrorsely superior. Fruit oblong, terete, often costate, drupaceous or coriaceous, naked or (?) widely 3–4-alate, indehiscent; seed descending; radicle of exalbuminous fleshy embryo macropod clavate; folioles of inferior gemmule ∞, decussate.—Trees or shrubs glabrous or sericeous; leaves distichously alternate, all equal or oftener the alternate ones minute stipuliform; the others larger, at base equal or unequal, 3–7-plinerved at base, coriaceous (often lutescent), exstipitate; flowers axillary spicate or subracemose, articulate; bracteoles minute or 0. (*Trop. Asia, Malaya, Malacca, trop. west. Africa.*)—See p. 295.

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[1] *Syst.* ii. [1825] 559.—H. Bn. *Adansonia*, iii. 27, 38.—B. H. *Gen.* 681, n. 11.—Hook. *Fl. Ind.* ii. 440.—*Richiæia* Dup.-Th. *Gen. Nov. Mad.* 25.—*Anstrutheria* Gardn. *Calc. Journ. Nat. Hist.* vi. 344, t. 4.—Benth. *Journ. Linn. Soc.* iii. 70, 78.

[2] Micropyle densely closed.

Fleshy; valves thick 3, 4.

[4] Arillate; radicle of often coloured (greenish) embryo superior, subcapitate at apex.

[5] Flowers (where known) white.

[6] A genus very likely, together with *Dactylostemon*, better referred to a section of *Cassipourea* (?).

[7] Spec. about 9. DC. *Prodr.* iii. 34 (*Cassipourea*).—Benth. *Niger*, 341 (*Cassipourea*).—Tul. *Ann. Sc. Nat.* sér. 4, vi. 119, n. 1–5, 7 (*Cassipurea*).—Thw. *Enum. Pl. Zeyl.* 121 (*Anstrutheria*).—Oliv. *Fl. Trop. Afr.* ii. 410.—Walp. *Ann.* ii. 173 (*Anstrutheria*); vii. 952 (*Cassipourea*).

LIV. MYRTACEÆ.

I. MYRTLE SERIES.

The best known plant of the Myrtle genus[1] is doubtless the common Myrtle (fig. 277–283), so frequently cultivated in our gardens. Its flowers are hermaphrodite and regular, with a receptacle in the form of a deep cut in the cavity of which is lodged the adnate ovary, whilst the perianth and androecium are inserted in its margin. The

Myrtus communis.

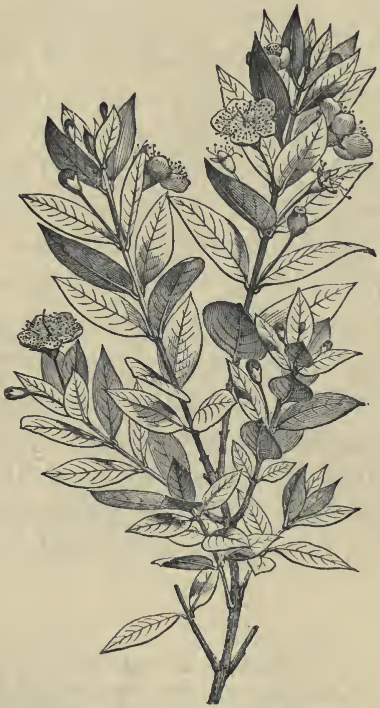

Fig. 277. Floriferous branch ($\frac{1}{2}$).

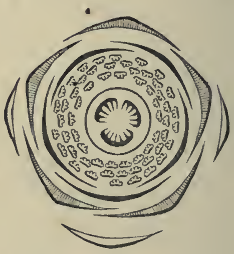

Fig. 279. Diagram.

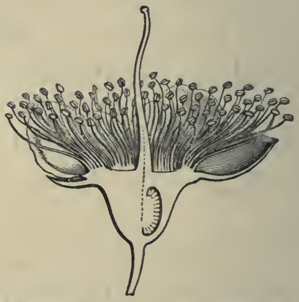

Fig. 280. Long. sect. of flower ($\frac{2}{1}$).

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[1] *Myrtus* T. *Inst.* 640, t. 409.—L. *Gen.* n. 617 (part).—Adans. *Fam. des Pl.* ii. 88.—J. *Gen.* 324.—Lamk. *Ill.* t. 419.—Poir. *Dict.* iv. 404; Suppl. iv. 49.—DC. *Prodr.* iii. 238 (part).—Spach, *Suit. à Buffon*, iv. 157.—Endl. *Gen.* n. 6316 (part).—Payer, *Organog.* 459, t. 98.—H. Bn. *Payer Fam. Nat.* 363.—Berg, *Linnæa* xxvii. 397; xxix. 253; xxx. 710.—B. H. *Gen.* 714, n.

calyx is formed of five imbricate sepals, the margins of which are contiguous for only a short distance. Five sessile petals alternate with the sepals and are imbricate in prefloration. The stamens are very numerous, epigynous, and at adult age disposed without any apparent order.[1] Each is formed of a free filament, inflexed in the bud, and of a short bilocular introrse anther[2] dehiscing by two longitudinal clefts.[3] The inferior ovary contains two or three cells in the internal angle of which is found a placenta bearing an indefinite number of small anatropous ovules. The fruit surmounted by the remains of the now fleshy calyx, is a berry enclosing one or several reniform seeds,[4] with a large fleshy hilum, hard coats, covering a curved fleshy embryo, destitute of albumen. The summit of the cotyledons and that of the radicle are turned towards the umbilicum. The common Myrtle is a shrub with simple opposite leaves, without stipules, permeated with reservoirs of an odorous essence. The flowers are ordinarily solitary, and the axillary peduncle bears two lateral bracteoles in the upper part.

Myrtus communis.

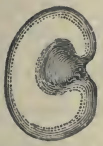

Fig. 282. Seed ($\frac{5}{1}$).

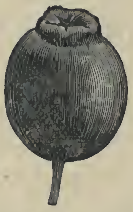

Fig. 281. Fruit ($\frac{2}{1}$).

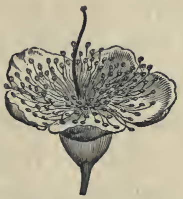

Fig. 278. Flower.

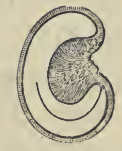

Fig. 283. Long. sect. of seed.

49.—*Anamomis* Griseb. *Fl. Brit. W.-Ind.* 240.—*Blepharocalyx* Berg, *Linnæa*, xxvii. 412; xxix. 256.—*Macropsidium* Bl. *Mus. Lugd.-Bat.* i. 85.—? *Temus* Mol. *Chil.* 153.—DC. *Prodr.* i. 77.—C. Gay, *Fl. Chil.* i. 60.—Phil. *Bot. Zeit.* (1857), 392, 393.—*Temu* Berg, *Linnæa*, xxx. 710.—*Myrteola* Berg, *Linnæa*, xxvii. 393; xxix. 252; xxx. 709.—*Ugni* Turcz. *Bull. Mosc.* (1848), i. 579.—*Myrcianthes* Berg, *Linnæa*, xxvii. 315 (incl.: *Calycolpus* Berg, *Luma* A. Gray, *Pseudocaryophyllus* Berg).

[1] The stamens originate in *Myrtus*, as in *Callistemon*, *Eucalyptus*, by groups superposed to the petals (Payer, *Organog.* 461), but they remain distinct to the end in *Callistemon*, whilst in the Myrtles "they are soon confused with each other so that they cannot be recognized."

[2] Basifixed, or versatile.

[3] The pollen, in all the *Myrtaceæ* of our first three series, where it has been studied, has appeared "depressed, triangular, the sides often a little reentrant; three very slight folds, which unite at the poles on a triangular piece; in water approaching more or less a spherical form, producing small papillæ at the angles. Grains small, transparent, not viscous." (H. Mohl. *Ann. Sc. Nat.* sér. 2, iii. 333). The bands may be more or less wanting (in certain species of *Psidium*), and the angles bear but slightly prominent papillæ (*Myrcia*).

[4] They are sometimes separated by the rudiments of false partitions, as happens in *Myrteola* (*Leandria* A. Gray).

There are Myrtles which frequently have as many ovarian cells as petals and which, consequently, would represent the most complete types of the genus. But at the same time their sepals are often large and foliaceous. These have been distinguished under the name of *Calycolpus*;[1] they are all American. In those which have been named *Luma*,[2] the seminal coats are membranous. Many have tetramerous flowers[3] and some also a caducous calyx. Instead of being solitary, the flowers may be in cymes 3–7-florous or formed of an indefinite number of flowers, biparous, or triparous.[4] Thus constituted,[5] this genus includes some sixty[6] species,[7] arborescent or oftener frutescent, glabrous or tomentose, natives of nearly all the warm regions of the globe. Beside this genus are placed a great number of others scarcely differing from it and most frequently separated from it only by characters quite artificial and mostly of very little value. Among those which have been proposed, we shall distinguish only the following, the number of which might perhaps be still further reduced without inconvenience.

Rhodomyrtus, inhabiting Oceania, chiefly the Indian Archipelago, consists of Myrtles in which the ovules, numerous in each cell, are isolated in a great number of cellules bounded by false partitions formed between them by the hypertrophiate placentæ. *Decaspermum*, native of the same countries, has also nearly all the characters of Myrtles and ovarian cells divided into uniovulate cellules by false partitions; but the latter are vertical, and the ovules, few in number (two to four) which they separate from each other, are descending. *Pimenta* is also very near the Myrtles, and the cells, two in number, likewise enclose a limited number (one to three or four) of descending ovules, inserted very near the summit, and with micropyle finally lateral; but there are no false partitions. *Pimenta* is from tropical

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[1] Berg, *Linnæa*, xxvii. 378.—B. H. *Gen.* 713, n. 47.

[2] A. Gray, *Unit. St. Expl. Exped. Bot.* i. 535, t. 66.—*Myrceugenia* Berg, *Linnæa*, xxvii. 131; xxx. 669.

[3] White or pink.

[4] As happens in *Pseudocaryophyllus* (Berg, *Linnæa*, xxvii. 415; xxix. 256).

[5] Sect. 4 (B. H.): 1. *Ugni* (Turcz.), flowers solitary oftener 4-merous;—2. *Eumyrtus* (*Myrtus* Berg), flowers 1–3-nis, oftener 5-merous;—3. *Leandria* (A. Gray);—4. *Luma* (A. Gray), flowers 1–7-nis, oftener 4-merous; cotyledons flat or sometimes contortuplicate.

[6] Double have been admitted.

[7] H. B. K. *Nov. Gen. et Spec.* vi. 129, t. 359.—Sibth. *Fl. Græc.* t. 475.—A. S. H. *Fl. Bras. Mer.* ii. 292, t. 140, 141.—Miq. *Fl. Ind.-Bat.* i. p. i. 476.—Berg, *Mart. Fl. Bras. Myrt.* 210, t. 25 (*Myrceugenia*); 351, t. 32 (*Myrcianthes*); 411, t. 13 (*Calycolpus*); 413, t. 44, 45; 420, t. 46 (*Blepharocalyx*); 429, t. 47 A (*Pseudocaryophyllus*).—Thw. *Enum. Pl. Zeyl.* 114.—Benth. *Fl. Austral.* iii. 273.—Hook. f. *Handb. N.-Zeal. Fl.* 73.—Br. et Gr. *Ann. Sc. Nat.* sér. 5, iii. 212.—Griseb. *Fl. Brit. W.-Ind.* 237.—Gren. et Godr. *Fl. de Fr.* i. 602.—Walp. *Ann.* iv. 832.

America and has numerous flowers in ramified groups of cymes. *Myrcia*, American like *Pimenta*, has all its essential characters; but the ovules, equally restricted in number (two in each cell), are ascending instead of descending, and their seeds have large contortuplicate cotyledons. In *Rhodamnia*, comprising shrubs of Asia and tropical Oceania, the flowers, ordinarily tetramerous, are also those of the Myrtles, and the ovules are numerous; but the ovary has only one cell; so that these plants may be defined as Myrtles with two parietal placentæ. *Fenzlia*, Australian shrubs, have also parietal placentation, but ordinarily only in one cell, as the other generally becomes more or less abortive, and on the placenta there are only two, three, or four superposed ovules which, having become seeds, are isolated each in a cellule formed by the false partitions of the putamen (the fruit being drupaceous). *Feijoa*, a Brazilian shrub, has also the flowers of a Myrtle, with complete or incomplete and multiovulate ovarian cells. But the staminal filaments, instead of being at first incurved, are straight in the bud and lengthen rapidly during anthesis; the embryo is said to be surrounded by albumen.

The genus *Marlieria* is also American, and its flowers are organized like those of the Myrtles, with the ovary of *Myrcia*, *i.e.* with cells containing each two ascending ovules; but it is distinguished by the mode of insertion of the stamens and by the conformation of the calyx. The floral receptacle, after lodging the ovary at the bottom of its cavity, is prolonged in a hollow tube on which are inserted by steps the pieces of the andrœcium. The perianth, inserted on the margin of this tube, is formed of petals which may be wanting and of a gamosepalous calyx quite closed and opening only by tearing in the true *Marlieria*, or very shortly lobed and not completely closed in those named *Eugeniopsis*. *Calyptranthes*, trees or shrubs from tropical America, have all the characters of the true *Marlieria*, and are distinguished only by the mode in which the calyx detaches itself circularly by its base and in a single piece, like a hood.

Campomanesia has the calyx of *Calyptranthes* or rather of *Marlieria*, for it tears deeply from top to bottom, and thus forms from four to six unequal lobes. The ovary has from four to ten cells and is surmounted by a style at summit stigmatiferous peltate or capitate. In each cell the ovules are disposed in two or four vertical series. The fruit encloses several seeds the embryo of which is spirally rolled. It comprises American trees and shrubs. One has been distinguished under the name of *Paivœa*, because its receptacular cup, before bearing the calyx, is dilated outwards into a sort of large horizontal circular disk. These plants differ little from the Guyavas (*Psidium*), long known by the form of their calyx (fig. 284, 285), which is valvate, gamophyllous, membranous, and which tears at the time of anthesis to release the internal organs. The ovary has from two to eight cells in which the ovules, very numerous, are disposed in many series. The fruit is a berry, the pulp of which encloses a variable number of seeds, with curved or spiral embryo and short cotyledons. The Guyavas are probably all of American origin, but several have long since been introduced into the tropical regions of the old world. *Psidiopsis* has been generically distinguished from them, because the summit of its calyx is dilated into five foliaceous layers. *Myrrhinium*, a South American shrub, has the leaves, the flowers, and the fruit of a Myrtle, and is immediately distinguished by the almost definite number of its long stamens. There are often only four, that is one facing each sepal; but from five to eight are not unfrequently observed, because, in this case, there are one or more pairs where in the isostemonous flowers only one stamen is seen.

Psidium pomiferum.

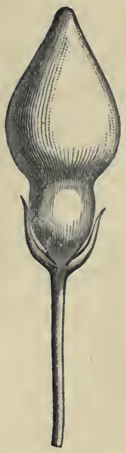

Fig. 284. Bud.

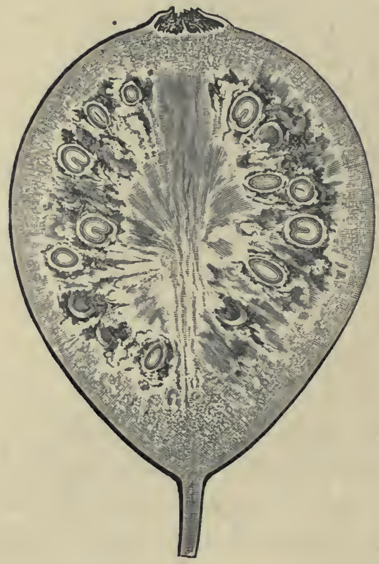

Fig. 285. Long. sect. of fruit.

Eugenia (fig. 286–289), formerly confounded with the Myrtles, has quite the flower, and differs from them only by one character, viz., that their seeds, ordinarily solitary or few in number, have a large straight embryo, with a short radicle and thick hemispherical cotyledons, placed against each other or even united by their plane surface. Two things differ chiefly in their organization; the inflorescence and the form of the receptacle. The former is a simple or compound cluster, reduced even to one flower, or it is in cymes, as in *Jambosa* and *Syzygium.* This latter name is derived from the fact that the petals may be united in a single piece and detached by the base as a hood ; but this character is far from being constant. The floral receptacle may be more or less globular or turbinate and prolonged above the inferior ovary as in *Jambosa*, or lengthened to a tube, as in *Eugenia* (*Caryophyllus*) *aromatica* (fig. 288, 289), or to an obconical horn, as in *Clavimyrtus*, and this horn may even be very long (*Cuphœanthus*), smooth without or covered with thick vertical wings (*Pteromyrtus*), without the other essential characters being modified. Hence a very large number of divisions in this genus, which, comprising some five hundred species, very abundant in America, but existing also in all the tropical regions of the old world, is represented by trees and shrubs with leaves almost always opposite, without stipules, sometimes however opposite or verticilate by threes, analogous to those of the Myrtles.[1] The three genera *Aulacocarpus*, *Calycorectes*, and *Schizocalyx*, still

Eugenia Jambos.

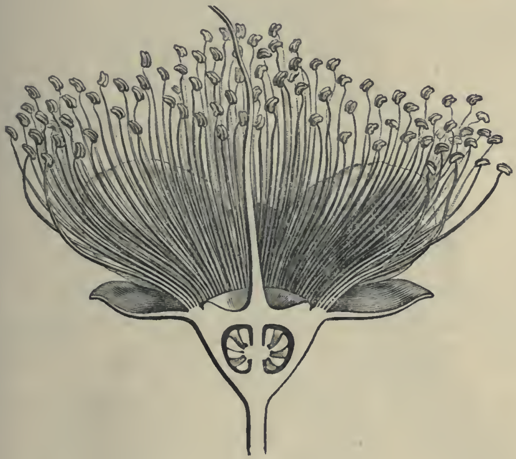

Fig. 286. Long. sect. of flower.

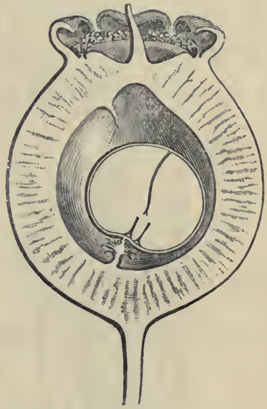

Fig. 287. Long. sect. of fruit.

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[1] Here probably ought to be placed two Oceanic species which would be to *Eugenia* what *Calyptranthes* is to *Myrtus*, that is its calyx is detached in one piece at its base like a hood. One which has received the name of *Acicalyptus*, has been hitherto doubtfully placed among the xerocarpous Myrtaceæ ; but its fruit is unknown, and it is apparently very near the other genus *Piliocalyx*, which has a fruit and seed of *Eugenia*. As to the flower

imperfectly known, range themselves doubtfully near *Eugenia*, from which perhaps they will not all be definitively separated. The first of these genera is American, likewise the second, remarkable for its stamens being inserted in numerous series on the receptacular tube. In the third (which has been doubtfully referred to the preceding), has been placed a Brazilian species and also a species from New Caledonia, the calyx of which is somewhat different as regards alternative prefloration.

Eugenia (*Caryophyllus*) *aromatica.*

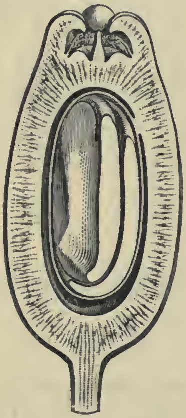

Fig. 289. Long. sect. of fruit.

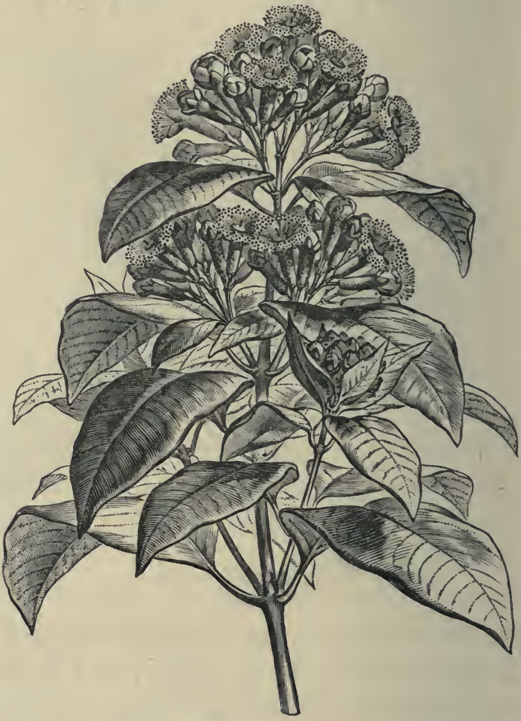

Fig 288. Floriferous branch.

II. LEPTOSPERM SERIES.

In the genus *Leptospermum* [1] (fig. 290–293), which has given its name to quite a group of *Myrtaceæ* with dry fruit,[2] the flowers are

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Acicalyptus has ovarian cells (complete or incomplete) containing numerous anatropous ovules, arranged on vertical placentæ; and *Piliocalyx*, orthotropous and descending ovules, inserted in each cell on a placenta nearly apical.

[1] Forst. *Char. Gen.* 71, t. 36.—J. *Gen.* 323.—Gærtn. *Fruct.* i. 174, t. 35 (part).—Lamk. *Dict.* iii. 465; Suppl. iii. 336; *Ill.* t. 423.—DC. *Prodr.* iii. 226 (part).—Spach, *Suit. à Buffon*, iv. 141.—Endl. *Gen.* n. 6309.—H. Bn. *Payer Fam. Nat.* 367.—B. H. *Gen.* 703, n. 18.—*Fabricia* Gærtn. *Fruct.* i. 175, t. 35.—Endl. *Gen.* n. 6310.—Hook. *Fl. Ind.* ii. 464.—*Pericalymna* Endl. *Gen.* n. 6307.—Schauer, *Pl. Preiss.* i. 120.—*Homalospermum* Schau. *Linnæa*, xvii. 242.—*Glaphyria* Jack, *Trans. Linn. Soc.* xiv. 128.—*Macklottia* Korth. *Ned. Kruidk. Arch.* i. 196.

[2] Myrtaceæ-xerocarpeæ (Schauer).

generally hermaphrodite[1] and pentamerous. Their receptacle is concave, obconical or nearly and widely open. Its margin bears five sepals, primarily imbricate,[2] membranous, and as many alternate petals, imbricate in the bud. The latter are inserted outside the margin of a glandular disk which lines the cavity of the receptacle. The same is the case with the stamens formed each of a short[3] free filament, inflexed in the bud, and a short bilocular introrse anther, dehiscing by two longitudinal clefts, afterwards versatile. They are indefinite in number, sometimes few, and appear, at adult age, disposed in a single series, though unequal.[4] The gynæcium is composed of an inferior ovary, imbedded at the bottom of a receptacular cavity, united with it to a variable extent, above[5] almost flat or slightly convex. It may have five oppositipetalous cells, or less,[6] or many more,[7] and it is surmounted by a style, the stigmatiferous extremity of which is truncate, or capitate, or peltate. In the internal angle of each cell are found ovules ordinarily very numerous, more rarely indefinite in number. The mode of insertion is very variable. Sometimes they are arranged in two series, on a slight placentary projection, and sometimes in a circle on the margin of a peltate placenta, itself attached to the internal angle by a short horizontal or oblique foot.[8] They are anatropous, rectilinear, or curved.[9] The fruit (fig. 293), the base of which is imbedded in the receptacular capsule, is a depressed, loculicidal capsule, the seeds of which, linear, cuneiform or angular, not unfrequently winged or ciliate, enclose a straight fleshy embryo, with elongate cotyledons. *Leptospermum* consists of small

Leptospermum flavescens.

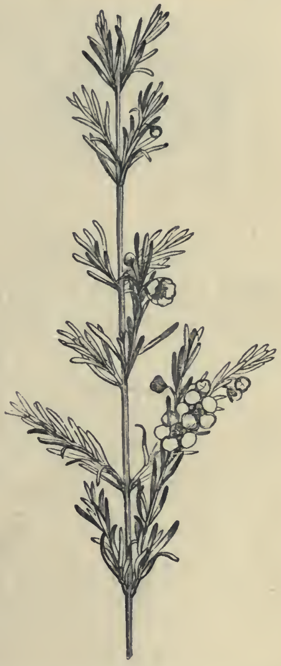

Fig. 290. Floriferous branch (½).

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[1] The gynæcium is not unfrequently aborted.

[2] A character which soon disappears.

[3] Its base is often swollen and articulate as it were to the margin of the disk.

[4] With 30 or 35 stamens, for example, there are often 4, 5, before each sepal and 1–3 before each petal. With 15, there will be frequently 2 facing each petal. The connective often bears near its summit a dorsal gland found in many of the neighbouring genera.

[5] It may bear glandular processes.

[6] Ordinarily 3 in the sect. *Pericalymna.*

[7] To 10 in *Fabricia.*

[8] On the small value of these variations, see *Bull. Soc. Linn. Par.* 56.

[9] The ovular coat is double.

trees or shrubs inhabiting, to the number of about twenty-five species,[1] Oceania, and chiefly Australia. The leaves, simple and alternate, often rigid and linear, punctuate and odorous, are destitute of nervures or 1–3-nerved, glabrous or pubescent. The flowers[2] are terminal or nearly so, or axillary, solitary or grouped in small bi- or triflorous cymes, sessile or pedicellate and accompanied by imbricate bracts.

Leptospermum flavescens.

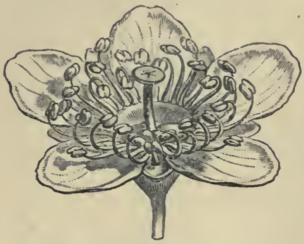

Fig. 291. Flower ($\frac{5}{1}$).

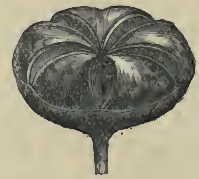

Fig. 293. Fruit ($\frac{2}{1}$).

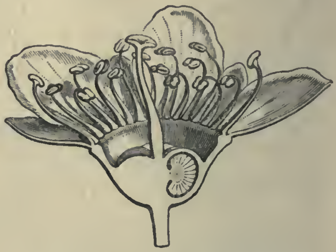

Fig. 292. Long. sect. of flower.

Bæckea virgata.

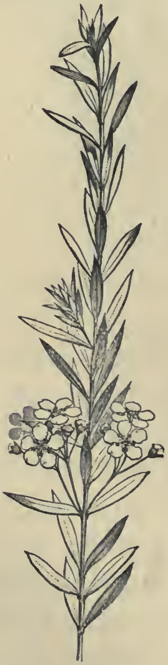

Fig. 294. Floriferous branch.

Agonis, of which some ten Australian species are known, was formerly confounded with *Leptospermum*; it is distinguished by the stamens, often less numerous, and the ascending ovules, two to four in number, inserted on a placenta itself ascending; differential characters which, in this group, are of very little value, and which, doubtless, we should consider too insignificant to establish a distinct genus, if the flowers of *Agonis* were not grouped in small globular capitules, axillary and terminal.[3]

Bæckea (fig. 294) is also very near *Leptospermum*. It has the flower, with an andrœcium isostemonous, diplostemonous or formed of from eleven to twenty-five stamens. The ovules are one or two in each cell, oftener indefinite in number, with all the varieties of placentation observed in *Leptospermum*; but they are immediately distinguished from the latter by their leaves being opposite

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[1] Cav. *Icon.* t. 330.—Vent. *Malmais.* t. 88, 89. —Sm. *Trans. Linn. Soc.* iii. 260.—Hook. *Icon.* t. 308, 893.—Hook. f. *Fl. Tasm.* t. 30.—Benth. *Fl. Austral.* iii. 100.—*Bot. Mag.* 1810, 2695, 3419.

[2] Small white or slightly pink.

[3] Themselves formed of glomerules, so that the inflorescence is mixed.

(fig. 294) instead of alternate. They are also Oceanic shrubs, often ericoid. The embryo has small cotyledons relatively to the radicle which is thick and swollen. *Hypocalymna*, the ovarian cells of which enclose from one or two to an indefinite number of ovules, has been generically separated more especially because the stamens were thought to be monadelphous. But if the greater part of them are, in fact, slightly united by the base of the filaments, there are also some which are entirely independent. *Scholtzia* has also been distinguished as a genus because the placenta bears from two to four ovules and the receptacle scarcely rises above the ovary; we can only consider both as sections of the genus *Bœckea*.

In *Astartea*, which perhaps ought no longer to be separated from *Bœckea*, all the characters of vegetation and of floration are similar; but the stamens are pentadelphous, each group corresponding to the intervals of the petals. In *Balaustion*, native, like *Astartea*, of Australia, the leaves and flowers (rather large) are equally those of *Bœckea*; but the receptacle has the form of a large urceolate sac at the bottom of which is the ovary, and at the throat are inserted the perianth and pentamerous andrœcium.

Melaleuca (fig. 295, 296) gives its name to a small group of genera, numerous in species, in which the flowers often have the stamens united in as many exserted groups as the flower has parts, and these groups are oppositipetalous. *Melaleuca* has the same number of multiovulate, rarely uniovulate, cells, with the ovules inserted in the internal angle, in two or more series, arranged on a vertical or peltate placenta, with short, horizontal or more or less oblique support. There are some whose stamens are scarcely united in bundles

Melaleuca fulgens.

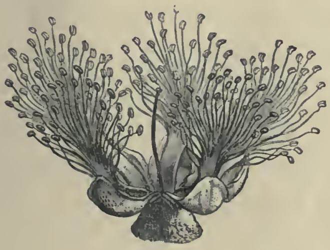

Fig. 295. Flower ($\frac{3}{1}$).

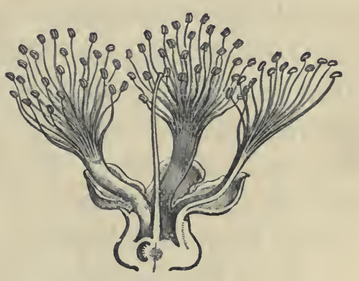

Fig. 296. Long. sect. of flower.

at the base, and others where they are quite free, and yet we cannot separate generically one from the other. Hence the impossibility we find of retaining as a distinct genus *M. paludosa* and some neighbouring species separated under the name of *Callistemon*. On the other hand, the staminal bundles are often united together at the base in a very short tube. This tube is exceptionally prolonged in *Lamarchea*, which we make only a section of *Melaleuca*. This belongs to tropical Asia and Oceania. *Beaufortia*, all Australian, has the flower of *Melaleuca*, with the stamens united in oppositipetalous bundles; but the anthers are basifixed instead of being versatile as in the preceding genera. They open by clefts longitudinal or short and near the summit, sometimes reduced to pores. The ovarian cells enclose one or from two to four ovules, of which several may remain sterile or disappear altogether. In *Calothamnus*, the foliage, the habit, the mode of inflorescence are all those of *Beaufortia*, and the anthers are basifixed, oblong or linear, with parallel cells, dehiscing internally by longitudinal clefts. The ovules are numerous in each cell, with all the varieties of placentation observed in *Melaleuca*. They are all from western Australia, as are those of *Eremœa*, only artificially separated, which have flowers solitary or two or three in number towards the summit of the branches, instead of lateral and sessile, like those of *Calothamnus*, and short basifixed stamens, with exterior longitudinal clefts. *Kunzea* may have the inflorescence of *Eremœa*, or capitules with flowers more or less numerous. The flower is nearly the same; but the receptacular tube, more elongate and lined by a disk of circular border, bears, exterior to the latter, numerous free stamens, like those of *Callistemon*, with versatile anthers, not basifixed as those of *Eremœa*. They form a transition therefore between this group and the following (*Metrosidereœ*), of which they often have the flower.

Tristania alone among them has pentadelphous stamens, the bundles being oppositipetalous, sometimes short, sometimes longer than the corolla. The ovary, totally or only partly inferior, has three cells the ovules in which are indefinite in number; and, as in the greater part of the preceding genera, the placentæ which bear them are very variable in form, sometimes consisting of thick vertical cords, sometimes peltate and supported by a transverse or slightly oblique foot, with a head the periphery of which bears reflexed ovules. The fruit is a capsule, exserted or enclosed, loculicidal, with seeds elongate-cuneiform or dilated on one side to a wing. Natives of Oceania, from Australia to the north of the Indian archipelago, abundant in southern Asia and New Caledonia, *Tristania* has alternate or, more rarely, opposite leaves, and flowers in axillary more or less ramified and compound cymes.

Metrosideros (fig. 297, 298) has, like the following genera, free exserted stamens inserted in the periphery of the receptacular orifice. It has been observed in the warm regions of south-eastern Asia and Oceania, from Malaya to New Zealand and as far as the Cape of Good Hope and in south-western America. The placenta consists of two vertical lobes, thick and elongate, covered with ovules. It becomes salient, in the form of a short horizontal or ascending club, in *M. stipulacea*, of which has been made the Chilian genus *Tepualia*, where it bears a small number of ascending ovules, and in some Oceanic species, as *M. ciliata*, *paradoxa*, *chrysantha*, etc., where the ovules are more numerous and, more frequently still, inserted over the entire surface of a shield-like dilatation of its free extremity. They have served as type of the genus *Xanthostemon* and have, nearly always, alternate leaves, whilst the *Metrosideros* proper have generally opposite leaves. The calyx valvate or slightly imbricate, is ordinarily regular in the true *Metrosideros*, often a little irregular in *Xanthostemon*. In a species of which the genus *Pleurocalyptus* has been made, the summit separates irregularly on one side at the time of blooming and rises like a small unequal lid. These plants cannot, in our opinion, form distinct genera, and we shall consider them only as sections of *Metrosideros*. The same will be the case, notwithstanding its cymes contracted to a pedunculate head, with *M. glomulifera*, distinguished under the generic name of *Syncarpia*, whilst among *Eucalyptus*, we shall also find a few species presenting this same capitular arrangement of flowers and

Metrosideros tomentosa.

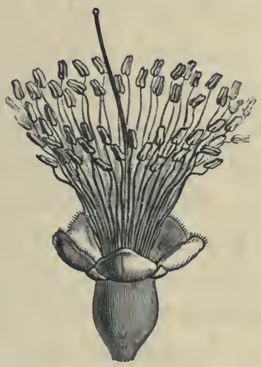
Fig. 297. Flower ($\frac{2}{1}$).

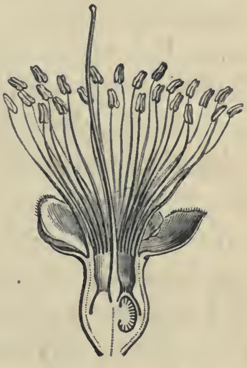
Fig. 298. Long. sect. of flower

fruit. What is more remarkable in this genus is that the situation of the ovary is extremely variable, with all the gradations possible from a total adherence to an entire independence of the gynæcium completely superior, as is the case in certain Australian and New Caledonian species of *Xanthostemon*. *Mooria* is scarcely distinct from *Metrosideros*; it has five pointed sepals, slightly imbricate, five petals and somewhat numerous stamens, shorter than the calyx, with an ovary semi-superior, the three cells of which enclose inferiorly an ascending placenta on which rise ovules indefinite in number, it is true, but often inconsiderable. The fruit is loculicidal, and the leaves are opposite, penninerved. It consists of small trees or shrubs from New Caledonia and the neighbouring isles. *Arillastrum*, likewise New Caledonian, has nearly the flower of *Metrosideros*, tetramerous, with a very large number of stamens and two multiovulate ovarian cells. But the capsular fruit, forming with the thickened and hardened receptacle, a deep obconical cup, is wide at the summit and sets free a single pea-shaped seed, with thick fleshy embryo, and thick folded cotyledons. The seminal coat is covered with a circle of scales, resembling an aril and corresponding to as many aborted seeds. The leaves are opposite, and the flowers axillary solitary or ternate at the summit of a common peduncle.

Eucalyptus (fig. 299–303) has given its name to a small sub-series (*Eucalypteæ*) constituted by it and the genus *Angophora*. The flowers have a concave receptacle the margin of which bears a gamosepalous calyx. In the genus *Eucalyptus* it is superiorly truncate entire or very rarely divided into four short and distant teeth. The name of the genus is derived from the corolla which here forms a hood analogous to that represented by the calyx of *Calyptranthes*, *Acicalyptus*, etc., and which, detaching itself circularly by the base, falls off in a single piece at the time of anthesis (it is extremely rare that it then divides into several segments). The stamens are very numerous and have versatile anthers, with cells dehiscing longitudinally. The capsular fruit, imbedded in the receptacle, opens from the summit along the middle line of cells. The Eucalypts are odorous trees, nearly all Australian; there are very few in the Indian Archipelago. The leaves are frequently variable in form, according to the age of the tree; the lower opposite and the upper often alternate. The flowers are axillary, solitary or in cymes. In *E. Lehmanni*, type of a genus *Symphyomyrtus*, the contracted inflorescence resembles a capitule, and the multiple fruit is here analogous to that of *Syncarpia* in *Metrosideros*. *Angophora* a near neighbour of *Eucalyptus*, and, like most of them, Australian, has nearly the same flower; but the petals, membranous and much imbricated, are nevertheless very distinct; the summit is sometimes prolonged into a sort of dorsal point. The calyx presents four or five distinct teeth. The other characters are those of *Eucalyptus*, of which *Angophora* has the gynæcium; where the seed is known, it is solitary and apparently peltate.

Eucalyptus Globulus.

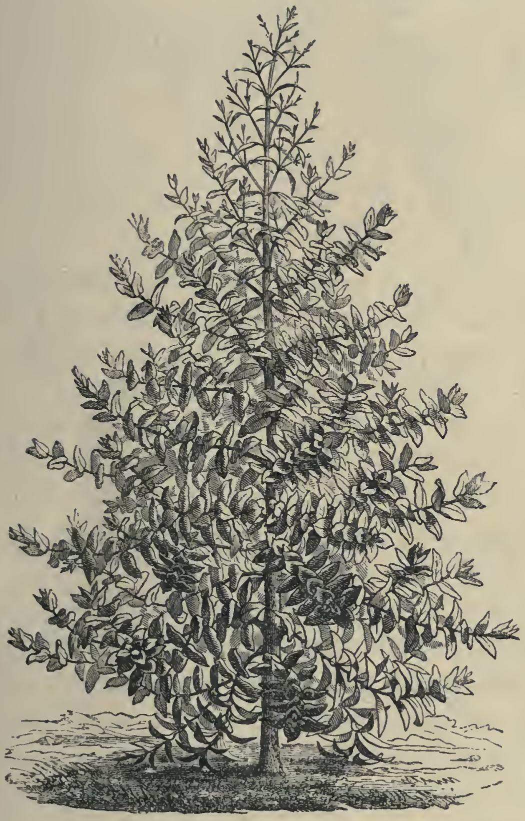

Fig. 299. Habit (of a young tree).

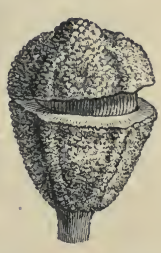

Fig. 300. Dehiscing bud.

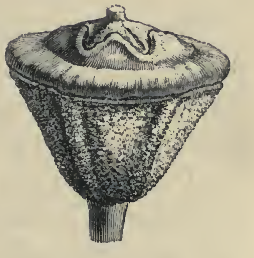

Fig. 303. Fruit.

This series further includes two Australian genera somewhat abnormal. One, *Backhousia*, has flowers the sepals of which become large and more or less petaloid, with shorter petals, and, in each of the two ovarian cells, an indefinite number of pendent or campylotropous and recurved ovules. The other, *Osbornia*, has a perianth still more exceptional, since, the corolla being entirely absent, the sepals, eight in number, are imbricate in two series. The cells of the inferior ovary are also two in number, and often incomplete. In the lower part of their internal angle is seen a placentary mass covered with anatropous ovules. In both genera the leaves are opposite and penninerved.

Eucalyptus Globulus.

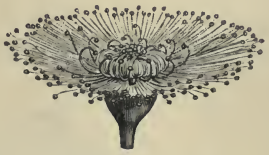

Fig. 301. Flower ($\frac{2}{3}$).

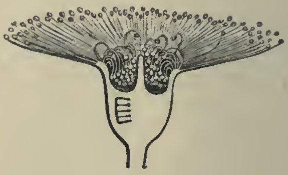

Fig. 302. Long. sect. of flower.

III. CHAMÆLAUCIUM SERIES.

Chamælaucium[1] (fig. 304, 305) has flowers ordinarily hermaphrodite[2] and pentamerous, with a hollow receptacle, very variable in form, obconical, tubular or urceolate, at the bottom of which is imbedded the ovary, whilst its upper opening bears a calyx of five small sepals, entire or ciliate, often petaloid. The five petals, longer and inserted in the intervals, are rounded, concave, imbricate in the bud and ordinarily very caducous. The andrœcium is formed of two verticils of stamens,[3] superposed, five to the sepals and five to the petals and formed each of a short filament, inflexed in the bud

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[1] DESF. *Mém. Mus.* v. 39, t. 3, fig. B.—DC. *Prodr.* iii. 209.—SPACH, *Suit. à Buffon*, iv. 110. ENDL. *Ann. Wien. Mus.* ii. 192; *Gen.* n. 6280. —SCHAUER, *Myrt. Xeroc.* t. 4 A.—H. BN. *Payer Fam. Nat.* 368.—B. H. *Gen.* 698, n. 6.—*Decalophium* TURCZ. *Bull. Mosc.* (1847), i. 153.

[2] The gynæcium may be sterile.

[3] They have been described in this genus, as in most of those in this group, as inserted on the margin of the disk, in a single series; but in reality they belong to two verticils, and the oppositipetalous are primarily the more elevated. With the stamens alternate an equal number of tongues, often equal to the staminal filaments, and ordinarily, for this reason, described as staminodes; they are only perhaps the lobes of the disk.

Chamælaucium uncinatum.

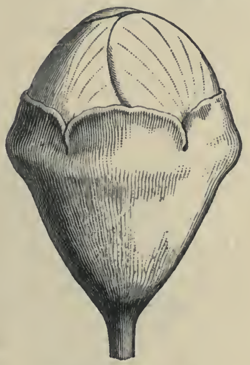

Fig. 304. Bud ($\frac{8}{1}$).

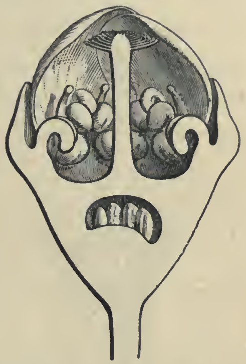

Fig. 305. Long. sect. of bud.

and enlarged at the summit, which supports the two adnate cells of an introrse anther dehiscing by two longitudinal clefts. The ovary is unilocular, surmounted by a subulate style somewhat enlarged at its stigmatiferous summit, which is often surrounded by long unequal and rigid hairs. From the lower part of the ovarian cell rises, sometimes along one of the partitions,[1] an eccentric placenta, of variable length, bearing from two to ten ascending ovules in two parallel series with micropyle directed downwards and outwards. The fruit, surmounted by a persistent calyx, is dry, indehiscent and contains one or a few seeds. *Chamælaucium* comprises shrubs of south-western Australia, having ordinarily the aspect of a Heath, with opposite, rarely alternate, leaves, small and entire, without stipules, oftener odorous. The flowers are solitary in the axils of the leaves or of the bracts, which replace them at the summit of the branches in such a manner that the entire inflorescence resembles a spike or terminal capitule. Each flower, sessile or supported by a short pedicel, is accompanied by two large and sinuous lateral bracteoles, at first enveloping the bud. About ten species have been described.[2]

Some species of *Darwinia* (fig. 306–308) differ from *Chamælaucium* only in the form of their anthers; the latter being nearly globular, and opening near their organic summit, that is above and without, by two very short longitudinal clefts, or two pores more or less confluent within. The flowers are in terminal capitules and situated in the axil of narrow or often wide and coloured bracts, forming a petaloid involucre (fig. 306). The sepals are mutichous, sometimes glandular at the summit. These plants, like all of the series, are

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[1] It would, in this case, be the anterior.

[2] SCHAU. *Pl. Preiss.* i. 97.—F. MUELL. *Fragm.* iv. 62.—TURCZ. *Bull. Mosc.* (1849) ii. 17 (*Genetyllis*). — MEISSN. *Journ. Linn. Soc.* i. 44.—BENTH. *Fl. Austral.* iii. 35.—WALP. *Rep.* ii. 154; v. 729.

Australian. *Actinodium* is a *Darwinia* with tetramerous diplostemonous flowers and stamens not accompanied by sterile tongues. *Homoranthus*, on the contrary, has these tongues in the intervals of its ten fertile stamens, for its flower is pentamerous, and in other respects it is quite that of a *Darwinia*; but the sepals are attenuated at the summit to a long subulate point, as we shall find those of *Calythrix* are; and this character, which otherwise would be of the smallest importance, has been thought sufficient here to distinguish this quite artificial genus. In *Verticordia* (fig. 309, 310), everything

Darwinia (Genetyllis) macrostegia.

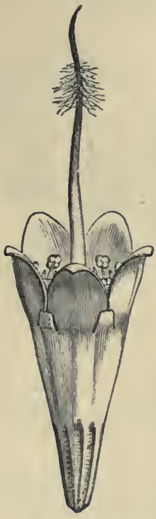
Fig. 307. Flower ($\frac{3}{1}$).

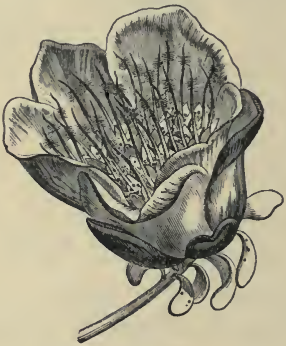
Fig. 306. Inflorescence.

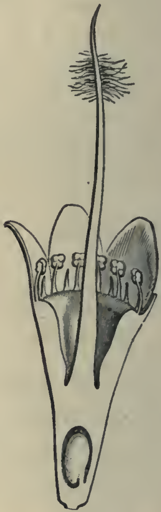
Fig. 308. Long. sect. of flower.

Verticordia Brownii.

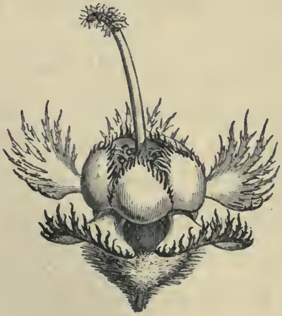
Fig. 309. Flower ($\frac{4}{1}$).

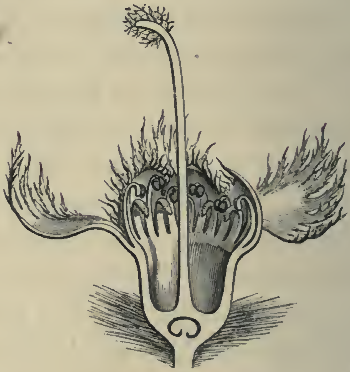
Fig. 310. Long. sect. of flower.

Calythrix scabra.

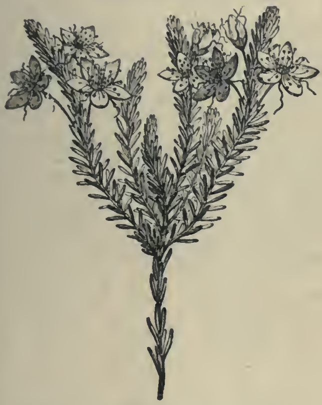

Fig. 311. Floriferous branch.

in the flower is equally that presented by *Chamælaucium* (or *Darwinia*); but the sepals, from five to ten in number, are cut into long plumose or ciliate strips. The ovary encloses one ovule nearly basilar, or two ovules and upwards, and the two lateral bracteoles which accompany the flower are wide, rounded, concave and imbricate, in such a manner as to form around the bud a complete accessory envelope; they are early detached. *Pileanthus* has the flower of *Verticordia*, with ten sepals not divided and twenty or more fertile stamens, without tongues interposed. There is often one opposite each sepal and a bundle opposite each petal. The anthers are those of *Chamælaucium*, and the flowers, like those of *Verticordia*, are at first enveloped by two large concave and imbricate bracteoles. *Lhotzkya* has a receptacle in the form of a long gourd surmounted by a narrow neck, dilated above to a cupule on which are inserted five obtuse sepals, five petals and numerous stamens, unequal and disposed in several series, but without glands interposed. *Calythrix* (fig. 311–314) differs only in the form of its sepals, prolonged at the

Calythrix scabra.

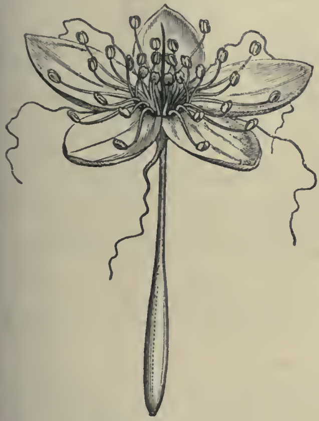

Fig. 313. Flower.

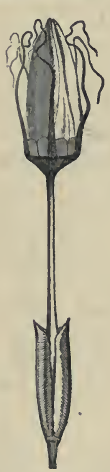

Fig. 312. Bud ($\frac{4}{1}$).

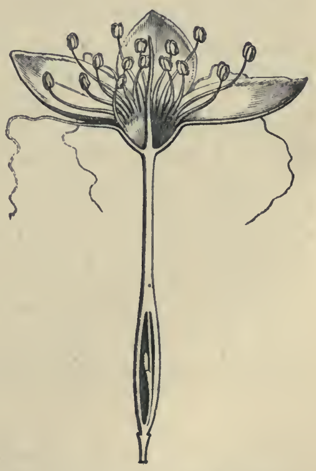

Fig. 314. Long. sect. of flower.

summit into long acuminate points; it is, consequently, to *Lhotzkya* (from which it can be separated only very artificially) what *Homoranthus* is to *Darwinia*. *Thryptomene* has flowers and organs of vegetation strongly recalling certain species of *Bœckea* and *Leptospermum*, and thereby approach genera of the preceding series. The sepals, five in number, are persistent, as likewise are the five alternate petals, most frequently connivent. It has five alternipetalous stamens, or ten stamens disposed in two verticils, without sterile tongues interposed. The unilocular ovary contains a placenta nearly basilar, but eccentric, or rising more or less on the partition and supporting from two to ten ascending ovules. The leaves are opposite, like those of *Bœckea*. From it have been distinguished *Homalocalyx*, having a caducous perianth, stamens indefinite in number, and alternate leaves, like those of *Leptospermum*, and *Micromyrtus*, having persistent sepals, open petals, ten stamens, or only five facing petals, with an ovary the single cell of which is traversed from the base to the summit by a filiform and pauciovulate placenta.

IV. BARRINGTONIA SERIES.

Barringtonia[1] has regular flowers rarely pentamerous, nearly always tetramerous (fig. 315, 316). In the latter case, the concave receptacle, in the form of an obconical horn, rarely urceolate, is nearly filled by the imbedded ovary and bears on its margin a valvate or imbricate-decussate calyx and four petals, imbricate in the bud. The stamens are indefinite in number, inserted perigynously like the perianth. The filaments are united below in a short ring which may also adhere with the base of the petals, free throughout their remaining extent, twisted or corrugate in the bud, straightened and exserted at the time of anthesis, and surmounted[2] by a small bilocular introrse anther, dehiscing by two longitudinal and often versatile clefts. The inferior ovary has two or four cells superposed to the petals. Its summit, nearly flat, is surmounted by a long style with an obtuse or slightly enlarged stigmatiferous extremity, and its base is surrounded by a circular collar, springing from the epigynous and more or less prominent disk. The placenta, which occupies the internal angle of each cell, supports two parallel series of transverse or obliquely descending ovules with their raphes facing each other. There are from one to four in each series, and besides a descending ovule is often found below, on the middle line, with micropyle superior and interior.[1] The fruit, fleshy and more or less fibrous, indehiscent, oblong or pyramidal, surmounted by a persistent calyx, usually contains only one seed, without albumen, with a fleshy embryo, thick and undivided.[2] *Barringtonia* comprises fine trees of the tropical regions of the old world. They have alternate leaves, collected near the summit of the branches, simple, entire or dentelate, penninerved, without stipules and without glandular punctuations. The flowers[3] are in spikes or clusters, often elongate and pendent, terminal or lateral. A score of species have been distinguished.[4]

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[1] FORST. *Char. Gen.* 75, t. 28.—GÆRTN. *Fruct.* ii. 96, t. 101.—DC. *Prodr.* iii. 288.—SPACH, *Suit. à Buffon*, iv. 185.—ENDL. *Gen.* n. 6325.—H. BN. *Payer Fam. Nat.* 368.—B. H. *Gen.* 720, 1006, n. 61.—BAKER, *Fl. Maurit.* 119.—HOOK. *Fl. Ind.* ii. 506.—*Butonica* J. *Gen.* 326.—LAMK. *Dict.* i. 521; *Ill.* t. 590.—*Commersona* SONNER. *Voy.* t. 8, 9.—*Mitraria* GMEL. *Syst.* 799 (ex ENDL.).—*Huttam* ADANS. *Fam. des Pl.* ii. 88.—*Stravadium* J. *Gen.* 326.—DC. *Prodr.* iii. 289.—BL. *V. Houtte Fl. Serr.* vii. 24.—*Meteorus* LOUR. *Fl. Cochinch.* (ed. 1790) 410.—*Stravadia* PERS. *Synops.* ii. 30.—*Menichea* SONNER. *Voy.* 138, t. 92, 93 (ex ENDL.).—*Botryoropis* PRESL, *Epimel.* 220.

[2] Sometimes, however, they are sterile.

Barringtonia (Stravadium) racemosa.

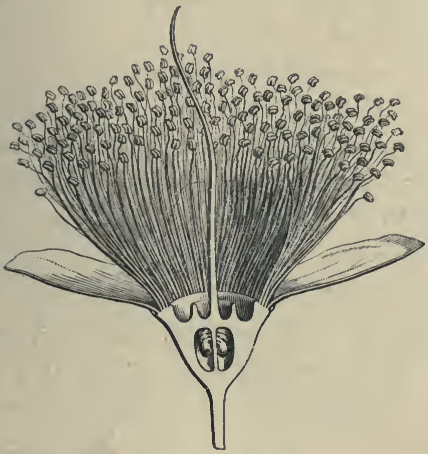

Fig 315. Long. sect. of flower.

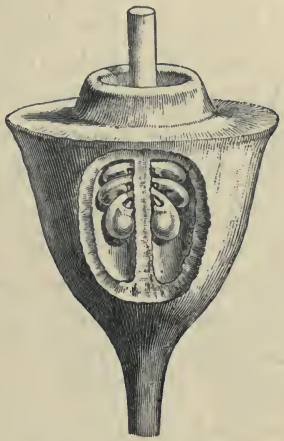

Fig. 316. Gynæcium, with ovary open ($\frac{4}{1}$).

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[1] They have a double envelope, and their exostome gives passage to a long cylindrical process.

[2] On the structure of the seeds, see Thoms. *Journ. Linn. Soc.* ii. 47. The embryo, fleshy at the centre, is at the periphery cortical ligneous.

[3] White, pink or red.

[4] Bl. *Bijdr.* 1096.—Wight and Arn. *Prodr.* i. 333.—Gaudich. *Voy. Freycin. Bot.* 483, t. 107.—Bl. *loc. cit.* 23, t. 654.—Wight and Arn. *Prodr.* i. 333.—Wight, *Icon.* t. 152, 547.—A. Gray, *Unit. St. Expl. Exp. Bot.* i. 508.—Benth. *Fl. Austral.* iii. 287.—Oliv. *Fl. Trop. Afr.* ii. 438.—Thw. *Enum. Pl. Zeyl.* 119.—Harv. and Sond. *Fl. Cap.* ii. 523.—Miq. *Fl. Ind.-Bat.* i. p. i. 485.—Walp. *Rep.* ii. 192; v. 156; *Ann.* ii. 641; iv. 850.—Hook. *Fl. Ind.* ii. 580.

Close beside *Barringtonia* are ranged *Careya* and *Planchonia* which ought not, perhaps, to be generically separated, and all which belong to the warmest regions of Asia and the Indian Archipelago. The former have the exterior stamens longer, and with the interior, destitute of anthers, with the undivided embryo of *Barringtonia*. The latter has the interior staminodes fertile and shorter than the stamens. The embryo has foliaceous and folded cotyledons, and a very long spirally-rolled radicle. *Petersia africana*, a large tree of Angola, is also said to have nearly all the characters of a *Barringtonia*, and especially its flower; but the alternate leaves are punctuate, and its floral receptacle bears, in the interval of the sepals, four large wings which only grow round the fruit in the form of vertical membranes, semi-orbicular and veined.[1]

The flowers of *Gustavia* present a great resemblance to those of *Barringtonia*. The inferior ovary is also lodged in the cavity of a turbinate receptacle the margin of which bears a calyx entire, or lobed, or 4–6-fid, and from five to eight imbricate petals. The stamens, very numerous, inserted round the margin of a circular epigynous disk, are free and all fertile, with a basifixed, elongate anther having two linear cells opening near the summit by a pore or short cleft. The inferior ovary is divided into four, five or six pluriovulate cells, and the indehiscent, fibrous fruit, encloses a small number of seeds, similar to those of *Eugenia*. It comprises fine trees or shrubs of tropical America; the leaves are alternate.

In *Gustavia*, the stamens form, above and around the ovary, a crown quite regular. Let these same stamens unite at the base and form a sort of tube, but unequal, because those on one side are longer than those on the other, and we have *Cariniana*, consisting of fine trees of tropical America, the inferior ovary of which, often trilocular, becomes, besides, quite a peculiar fruit. It is a sort of pyxis nearly cylindrical and traversed in the direction of its axis by a thick triangular columella surmounted by a woody operculum. The latter separates circularly from the rest of the fruit to liberate winged seeds, with contortuplicate embryo, formed of a large radicle

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[1] With doubt we place here the two genera *Fœtidia* and *Sonneratia*, recently referred by Bentham and Hooker (*Gen.* 724, 784), the one to anomalous *Myrtaceæ*, the other to *Lithrarieæ*. *Fœtidia*, native of the eastern isles of tropical Africa, has 3–5-merous apetalous flowers, with numerous stamens inserted above an inferior ovary, with alternisepalous cells. In the internal angle of the latter is found a pluriovulate placenta. The fruit is dry and woody, and the leaves are alternate without stipules. *Sonneratia*, with opposite entire coriaceous and exstipulate leaves, has the habit of the *Rhizophoreæ*. The flowers, 3–8-merous, have a convex receptacle, with an ovary adnate only in its lower part. The cells are numerous and multiovulate. There is also a very large number of stamens, and the sepals are valvate coriaceous persistent. The corolla is wanting or reduced to long narrow tongues. The fruit is in great part free, finally coriaceous, indehiscent and polyspermous. These maritime plants are found on nearly all the tropical shores of the old world.

Couroupita guianensis.

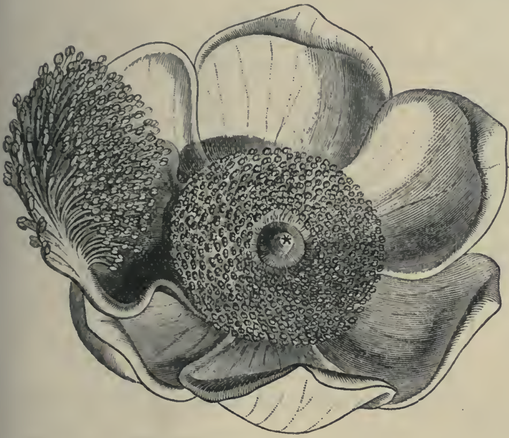
Fig 317. Flower.

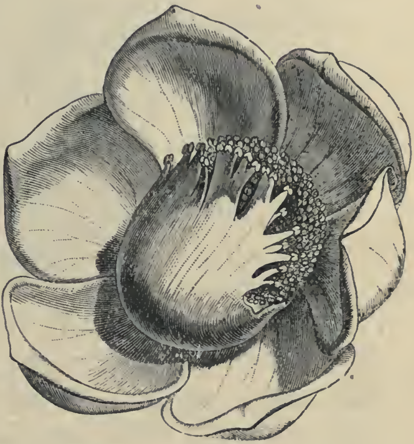
Fig. 318. Flower seen from above.

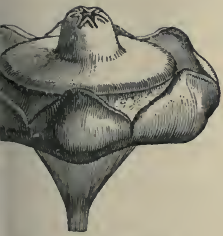
Fig. 320. Gynæcium.

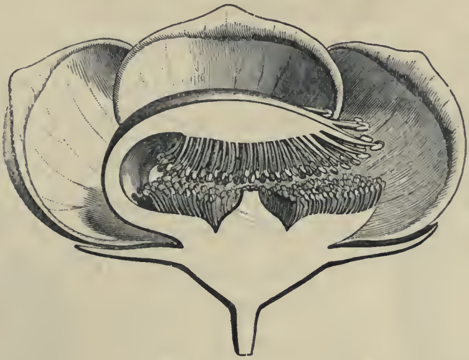
Fig. 319. Long. sect. of flower.

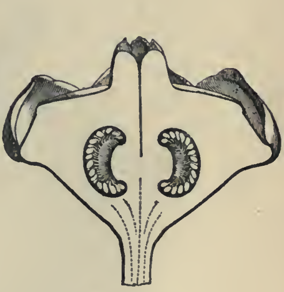
Fig. 321. Long. sect. of gynæcium.

and wide foliaceous cotyledons replicate upon themselves. All the stamens, more developed on one side of the flower than on the other, are fertile, and it is on this account chiefly that they have been separated from *Couratari*. The latter have, at the summit of a large unilateral ligule, sterile stamens, the anthers of which disappear or are reduced to small dimensions. *Couroupita* (fig. 317–321), from the same countries, has the same organs of vegetation as *Gustavia* and *Cariniana*; but the andrœcium is still more irregular.

The stamens, all fertile, form at first a complete crown within the perianth; then the common support straightens itself, in the form of a thick fleshy tongue, on one side of the flower, having the appearance of a sort of hood with its cavity over the summit of the gynæcium, and bears, after a tolerably long smooth surface, numerous fertile stamens, similar to those at the base. The fruit of *Couroupita* is globular or nearly so, coriaceous and crowned with a sort of operculiform cap, but which does not separate at maturity, as in *Couratari*. The seeds have the same embryo as the last. In *Lecythis* (fig. 322–326), the pyxide fruit is often large and with very thick and woody coats; it opens by a lid like that of *Couratari*, but it approaches in form (fig. 324) that of *Couroupita*. The flower also bears a strong resemblance to that of the latter; but those of the stamens which are inserted on the upper part of the great cuculliform ligule, are reduced to papilliform staminodes, instead of being fertile, like those of *Couroupita*. The seeds enclose a fleshy and undivided embryo.

Lecythis lanceolata.

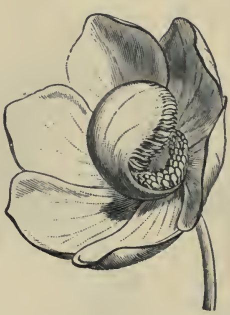

Fig. 322. Flower.

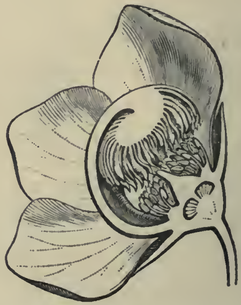

Fig. 323 Long. sect. of flower.

Lecythis Ollaria.

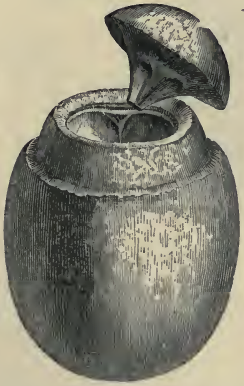

Fig. 324. Dehiscing fruit (⅕).

Lecythis Zabucayo.

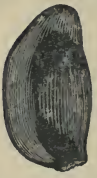

Fig. 325. Seed.

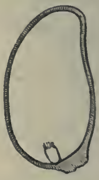

Fig. 326. Long. sect. of seed.

In the preceding genera, the sepals, often six in number, are distinct and more or less imbricate in young age. On the contrary, in *Bertholletia*, a fine tree of tropical America, the calyx is primarily a globular valvate gamophyllous sac, enveloping the rest of the flower and, at the time of anthesis, dividing from top to bottom ordinarily into two segments. The andrœcium is that of *Lecythis*, and the fruit opens at the summit by a small operculum. The triangular seeds (fig. 327, 328), which it contains in small number, enclose, under their resisting, rugose coats, a thick fleshy and undivided embryo.

Bertholletia excelsa.

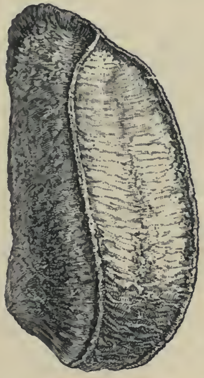

Fig. 327. Seed.

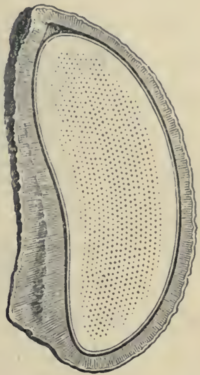

Fig. 328. Long. sect. of seed.

V. NAPOLEONA SERIES.

Napoleona[1] (fig. 329–333) has regular and hermaphrodite flowers, with concave receptacle. Its margin bears a calyx of five sepals,[2] valvate in the bud, and a gamopetalous corolla with five lobes alternating with the sepals, folded in a peculiar manner in the bud. It is lined with two concentric petaloid collarettes, which have been compared to the disks of *Passiflora*, adherent at the base to the corolla and falling with it. The exterior is formed of more slender coloured filaments; the interior, of flattened and petaloid tongues, at first incurved. The andrœcium is also united at the base with the corolla; it is formed of five bundles of stamens, superposed to the sepals. Each bundle generally contains four stamens, the two exterior alone being fertile, formed of a filament surmounted by a unilocular introrse anther dehiscing by a single longitudinal cleft. The filaments are petaloid and incurved in the bud in such a manner as to carry the anthers under the projection of the style, where they remain fixed for some time.[1] Within the andrœcium is a circular glandular disk which surrounds the ovary. The latter is imbedded in the cavity of the receptacle, and hollowed into five oppositipetalous cells, surmounted by a short and thick style, soon dilated to a

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[1] Pal.-Beauv. *Fl. Owar.* ii. 29, t. 78.—Turp. *Dict. Sc. Nat.* Atl. t. 66.—Spach, *Suit. à Buffon*, ix. 427.—A. Juss. *Ann. Sc. Nat.* sér. 3, ii. 227, t. 4.—Endl. *Gen.* n. 4263.—B. H. *Gen.* 723, n. 71.—H. Bn. *Payer Fam. Nat.* 370; *Bull. Soc. Linn. Par.* 58.—M. Mast. *Journ. Linn. Soc.* x. 492.—Miers, *Trans. Linn. Soc.* ser. 2, 1, t. 1, 2, 3 A.—*Belvisia* Desvx. *Journ. Bot.* iv. 130.—R. Br. *Trans. Linn. Soc.* xiii. 222; *Misc. Works* (ed. Benn.) i. 388.

[2] They bear, on each margin, a sessile gland resembling that of certain *Euphorbiaceæ*.

[3] They are traversed by longitudinal ridges which touch in the bud but afterwards separate without ceasing to be parallel, in consequence of the development of membranous furrows interposed between them.

Napoleona imperialis.

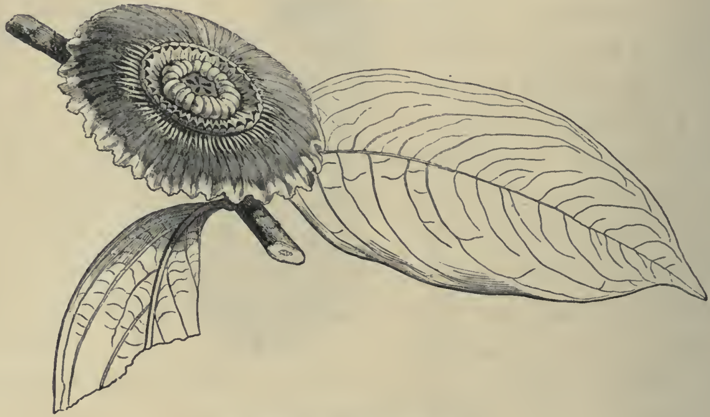

Fig. 329. Floriferous branch.

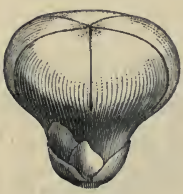

Fig. 330. Bud.

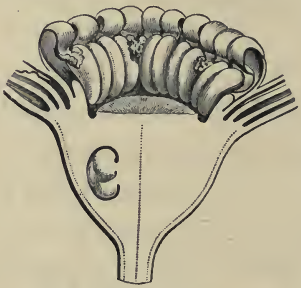

Fig. 333. Long. sect. of andrœcium and gynæcium ($\frac{2}{1}$).

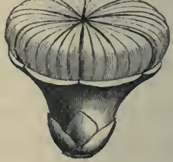

Fig. 331. Bud with calyx removed.

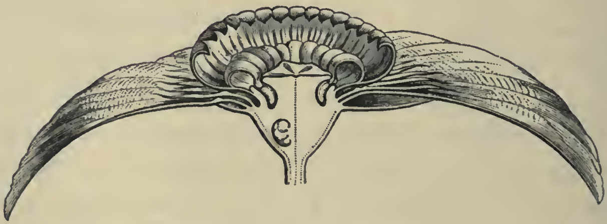

Fig. 332. Long. sect. of flower.

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[1] There is here a sort of hollow in the style to receive the anther in the bud. This is easily disengaged by cutting the head of the style transversely.

flat pentagonal stigmatiferous head, with salient oppositipetalous lobes. In the internal angle of each cell is a placenta supporting two vertical series of ovules finally descending,[1] with micropyle in this case directed upwards and inwards. The fruit is fleshy,[2] nearly globular, and surmounted by the remains or the scar of the calyx; it encloses, imbedded in its pulp, a variable number of seeds, the coats of which cover a thick reniform embryo, with fleshy plano-convex cotyledons and short radicle lodged in the hilum. *Napoleona* comprises trees from tropical western Africa, with alternate glabrous penninerved leaves, without punctuations and without stipules,[3] and axillary flowers,[4] solitary or in few-flowered glomerules, nearly sessile, surrounded by short alternate imbricate bracts, glanduliferous like the sepals, the shorter the lower they are. Six or seven species have been distinguished; there is perhaps only one.[5]

Asteranthos brasiliensis,[6] a tree of Para and Guyana, with alternate leaves, has nearly all the characters of *Napoleona*; it differs in its expanded gamosepalous calyx, dentelate at the margin; a much longer style, with stigmatiferous head much less dilated; elongate ovules, much more numerous, in a semi-inferior ovary. Within the corolla and united inferiorly with it, are a great number of stamens, with slender filaments and introrse bilocular anthers.

VI? POMEGRANATE SERIES.

In this genus,[7] which has served as a type for a distinct family, the flowers (fig. 334–338) are regular, hermaphrodite, with concave receptacle, obconical or nearly so, the bottom of which is filled with the adnate ovary, whilst the margin bears the perianth. The latter is formed of from four to eight sepals, coloured like the receptacle,[1] and like it coriaceous, thick, valvate, persistent, and of the same number of alternate petals, inserted in the intervals of the sepals, membranous, corrugate, imbricate in the bud. The stamens are very numerous and inserted at various levels on the internal surface of the tube formed by the receptacle above the ovary. Each is formed of a slender filament, at first incurved, and of a small bilocular introrse versatile anther dehiscing by two longitudinal clefts.[2] The inferior ovary is surmounted by a style which, at first flexuose, enlarged to a cone at the base, terminates in a head covered with stigmatic papillæ. In the ovary are two series of superposed cells;[3]

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[1] Or at first slightly ascending, with the raphe superior and interior.

[2] Corticate and coriaceous on the surface.

[3] With margins sometimes glanduliferous.

[4] Yellow and purplish or (?) bluish.

[5] *N. imperialis* P.-Beauv. *loc. cit.*—DC. *Prodr.* vii. 550.—*Bot. Mag.* t. 4387.—Oliv. *Fl. Trop. Afr.* ii. 439.—*N. Vogelii* Hook. *Niger*, 360, t. 49, 50.—*N. Heudoletii* A. Juss. *loc. cit.* It is this species which M. Decaisne (*Rev. Hort.* [1853] 301, t. 16) distinguishes under the name of *N. Whitfieldii*. Miers also multiplies the species of this genus.

[6] Desf. *Ann. Mus.* vi. 9, t. 3.—Endl. *Gen.* n. 4262.—Benth. *Journ. Linn. Soc.* iii. 80.—B. H. *Gen.* 724, n. 72.—Miers, *Trans. Linn. Soc.* ser. 2, i. 17, t. 3 B.—Walp. *Rep.* ii. 722 *Asteranthus*).

[7] *Punica* T. *Inst.* 636, t. 401.— L. *Gen.* n. 618.—Adans. *Fam. des Pl.* ii. 88.—J. *Gen.* 325. —Gærtn. *Fruct.* i. 183, t. 38.—Lamk. *Dict.* iii. 30; *Ill.* t. 415.—Schkuhr, *Handb.* t. 31.—Nees, *Nov. Act. Nat. Cur.* xi. 410, t. 11.—DC. *Prodr.* iii. 3.—Spach, *Suit. à Buffon*, iv. 288. —Endl. *Gen.* n. 6340.—Lindl. *Veg. Kingd.* 735.— Payer, *Organog.* 465, t. 99.— H. Bn. *Payer Fam. Nat.* 371.—Berg. *Mart. Fl. Bras. Myrt.* 514, t. 8, 9.—B. H. *Gen.* 784, n. 27. — Hook. *Fl. Ind.* ii. 580.

Punica Granatum.

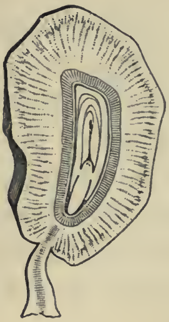

Fig. 338. Long. sect. of seed.

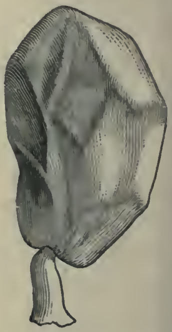

Fig. 337. Seed.

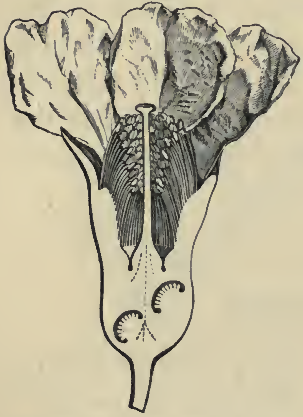

Fig. 335. Long. sect. of flower.

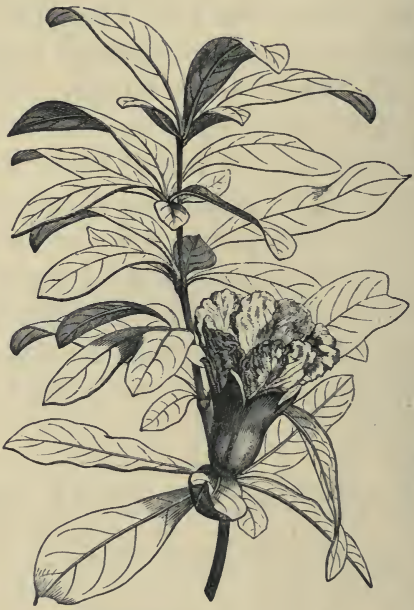

Fig. 334. Floriferous branch ($\frac{2}{3}$).

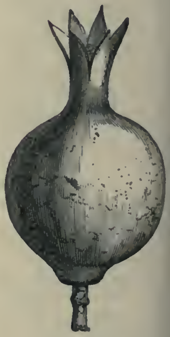

Fig. 336. Fruit ($\frac{1}{3}$).

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[1] Red or pale yellow.

[2] The pollen is "ovoid, approaching the sphere; threefold with papillæ" (H. Mohl, *Ann. Sc. Nat.* sér. 2, iii. 332).

[3] Organic investigation has revealed (Payer, *loc. cit.* 467) that the carpels belonging to the two verticils have at first the same direction, corresponding to that of the placentæ originally in their internal angle. If they become exterior in the carpels of the upper verticil, it is because the ovary has been reversed on the style (the stigmatiferous portion of which is aborted)

those of the upper series, five in number,[1] have their placenta parietal; in those of the lower series, three or more rarely five in number, it is in the internal angle. The ovules on each placenta are numerous, multiseriate, anatropous.[2] The fruit is a coriaceous corticate berry, surmounted by the persistent calyx and divided by membranous partitions into a variable number of irregular and polyspermous cells. The seeds, sessile or supported by a soft funicle, is distributed among them; this deforms[3] the outer coat which is thick, fleshy, pulpy, and the only portion edible. Interior to this is a very hard coat. The embryo, destitute of albumen, has a short radicle and two foliaceous cotyledons, auriculate at the base, rolled spirally round each other, like that of a great many *Combretaceæ*. The Pomegranates, of which several species have been described, but of which there is probably only one,[4] are shrubs of northern Africa and, as said, of western Asia, introduced into the warm and temperate regions of nearly the whole world. Their branches, sometimes spinous, are clothed with alternate or nearly opposite leaves or fasciculate at the nodal levels, obovate-oblong, entire, penninerved, without stipules. The flowers are axillary, solitary, or grouped in few-flowered cymes, with short pedicels.

This family is one of those which the older botanists suspected, so to speak, before even it was well defined. B. de Jussieu[5] designated it in 1759, under the name of *Myrtus*. Adanson,[6] in 1763, distinguished a family of Myrtles, very natural and admitted by A. L. de Jussieu[7] under the same name. R. Brown,[8] in 1814, gave it the name *Myrtaceæ*, soon followed by De Candolle,[9] who included in this family forty-seven genera, among which *Crossostylis*, *Petalotoma* (*Barraldeia*), *Coupoui* (?), belong to other families. In 1841, Schauer[10] published a monograph, which has become a standard,

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by a swing movement; so that the organic summit of this ovary is finally placed lower than its base.

[1] They are superposed to the sepals.

[2] They have a double coat.

[3] Whence the facets of their surface (fig. 337).

[4] *P. Granatum* L. *Spec.* 676. — Poit. and Turp. *Arbr. Fr.* 22.—Don. *Edinb. New Phil. Journ.* i. 134.—Wight and Arn. *Prodr.* i. 327. —Sims, *Bot. Mag.* t. 634, 1832.—Andr. *Bot. Repos.* t. 90.—Wight, *Ill.* t. 97.—Gren. et Godr. *Fl. de Fr.* i. 575.—*P. sylvestris* T.—*P. nana* L.—*Malum punicum* Lob. *Ic.* ii. 130.—*Malus punica* Bauh.

[5] Ex *A. L. de Juss. Gen.* lxx.

[6] *Fam. des Pl.* ii. 86, Fam. 14.

[7] *Op. cit.* 322, Ord. viii. *Myrti* (1789); *Dict. Sc. Nat.* xxxiv. 94 (*Myrteæ*).

[8] *Flind. Voy.* 14; *Misc. Works* (ed. Benn.), i. 18, 311.

[9] *Théor. Elém.* (*Myrtineæ*); *Prodr.* iii. 207, Ord. 79 (*Myrtaceæ*).

[10] *Linnæa*, xvii. 235: *Nov. Act. Nat. Cur.* xix. Suppl. ii.

and some supplementary memoirs,[1] in which he divided the *Myrtaceæ*, according to the consistence of their fruit, into *Xerocarpicæ* and *Chymocarpicæ*. Lindley[2] similarly divided them into *Leptospermeæ* and *Myrteæ*, and relegated to distinct orders the *Chamælaucieæ*[3] and the *Lecythideæ*[4] (*Barringtonieæ*). In 1840, Endlicher[5] reunited in one family the five sub-orders of *Chamælaucieæ*, *Leptospermeæ*, *Myrteæ*, *Barringtonieæ*, and *Lecythideæ*, adding to it *Granateæ* as allied to *Myrtaceæ*, that is to say, besides the types which have been excluded from the family, a total of sixty-seven genera (of which about a dozen are duplicates). In 1865, Bentham and Hooker[6] described or indicated seventy-eight genera of *Myrtaceæ*, some of which had just been established in France,[7] in America,[8] and in Australia,[9] but especially in Germany, by O. Berg,[10] the author who, in our day, has most studied this family. Bentham and Hooker have, besides, considered as doubtful genera of *Myrtaceæ*, *Fœtidia*, *Catostemma* and *Fropiera*, and reunited to the *Lythrariaceæ* the genera *Punica* and *Sonneratia*. By attaching to other generic types, previously established, *Astartea*, *Kunzea*, *Lamarchea*, *Regelia*, *Phymatocarpus*, *Syncarpia*, *Tepualia*, *Xanthostemon*, *Calycolpus*, and *Cuphæanthus*, which they retained as distinct, and by restoring to this family (not without some doubt) the two genera *Sonneratia* and *Fœtidia*, we reduce the number of genera[11] it includes to sixty-four distributed in the six following series :

I. Myrteæ.[12]—Fruit fleshy (or very rarely drupaceous). Ovarian cells $2-\infty$,[13] disposed regularly around the axis. Leaves opposite, punctuate.—19 genera.

II. Leptospermeæ.[14]—Fruit dry, generally capsular. Ovarian cells $2-\infty$ disposed regularly around the axis.—18 genera.

III. Chamælaucieæ.[15]—Fruit indehiscent, generally monospermous.[1] Ovarian cell single, more or less excentric. Leaves ordinarily ericoid, punctuate.—11 genera.

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[1] *Nov. Act. Nat. Cur.* xxi. p. i.

[2] *Veg. Kingd.* (1846) 734, Ord. 282.

[3] *Op. cit.* 721, Ord. 276.

[4] *Op. cit.* 739, Ord. 283.

[5] *Gen.* 1223, Ord. 269.

[6] *Gen.* 690, 1006, Ord. 67.

[7] Especially by A. Brongniart and A. Gris, for the little studied New Caledonian types (*Ann. Sc. Nat.* sér. 5, ii. 124; iii. 210), and previously by P. Montrouzier (*Mém. Acad. Lyon*, x.), for plants of the same country.

[8] By A. Gray (*Acicalyptus*).

[9] By F. Mueller (*Lysicarpus*, *Osbornia*, *Phymatocarpus*, *Homalocalyx*, etc.).

[10] *Linnæa*, xxvii. xxix. xxx. xxxi.; *Mart. Fl. Bras.* fasc. 18 (1857, 1858).

[11] Including about 1800 species. *Aphanomyrtus* (Miq. *Fl. Ind.-Bat.* i. p. i. 180) is a doubtful genus (B. H. *Gen.* 696).

[12] DC. *Prodr.* iii. 230.—*Chimocarpicæ* Schau. *loc. cit.*

[13] Sometimes only one in *Fenzlia*.

[14] DC. *loc. cit.* 209.—*Xerocarpicæ*, trib. 2, *Leptospermeæ* Schau.

[15] DC. *lcc. cit.* 208; *Dict. Class. d'Hist. Nat.* xi. (1826).—*Xerocarpicæ*, trib. 1, *Chamælaucieæ* Schau.—*Chamælauciaceæ* Lindl. *Veg. Kingd.* (1846) 721.

IV. Barringtonieæ.[2]—Fruit indehiscent or pyxid, often woody, coriaceous or fibrous. Andrœcium regular or irregular (*Lecytheæ*[3]). Leaves alternate, generally non-punctuate.[4]—13 genera.

V. Napoleoneæ.[5]—Fruit fleshy, cortical, inferior. Calyx valvate. Corolla gamopetalous, valvate-folded. Andrœcium regular. Anthers 1, 2-locular. Leaves alternate, non-punctuate.—2 genera.

VI. Puniceæ.[6]—Fruit cortical, coriaceous, inferior. Seeds externally fleshy. Cotyledons spirally rolled. Calyx valvate. Corolla polypetalous folded. Andrœcium regular, pluriseriate. Ovarian cells 2-seriate, multiovulate. Leaves alternate, non-punctuate.—1 genus.

The *Myrtaceæ* are plants from warm countries. There are some in New Zealand, in Chili, and in the Mediterranean region, but the greater part belong to tropical regions. In the south of Europe we find only one Myrtle and the Pomegranate, and the latter has doubtless been introduced, as have also several species from temperate America and Australia, which are cultivated in the open air in the Mediterranean region. All the *Chamælaucieæ* are Australian, and also the greater part of the genera belonging to the *Leptospermeæ*. Among the latter are several genera belonging to other parts of Oceania, and especially to the Indian Archipelago: such are *Melaleuca*, *Tristania*, *Leptospermum*, *Bæckea*, *Metrosideros*; the last is found in India, at the Cape, and in Chili. The Eucalipts are almost all Australian; but the genus is also represented in a very restricted manner in the Indian Archipelago. *Acicalyptus*, *Philiocalyx*, and *Spermolepis* have as yet been observed only in the Viti isles and in New Caledonia. There is only one American Leptosperm, *Tepualia* (*Metrosideros*). The distribution of Myrteæ is much more varied and extended; thus there are Myrtles in all parts of the world, and

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[1] More rarely dispermous.

[2] DC. *Dict. Class.* xi.; *Prodr.* iii. 288.—Endl. *Gen.* 1233.—*Lecythidaceæ* Lindl. *Veg. Kingd.* 739, Ord. 283.—*Lecythideæ* B. H. *Gen.* 695, trib. 4 (part Endl.).—*Barringtoniaceæ* Lindl. *op. cit.* 754.

[3] *Lecythideæ* Rich. ex Poit. *Mém. Mus.* xiii. 141.—Endl. *Gen.* 1234, Subord. 5.—Miers, *Trans. Linn. Soc.* xxx. 1.

[4] They are so, it is said, in *Petersia*.

[5] Endl. *Gen.* 745 (1839).—H. Bn. *Payer Fam. Nat.* 371, sect. 7.—*Belviseæ* R. Br. *Trans. Linn. Soc.* xiii. 222; *Misc. Works* (ed. Benn.) i. 388, not.—*Belvisiaceæ* Lindl. *Veg. Kingd.* 728, Ord. 280.—J. G. Ag. *Theor. Syst. Pl.* 132.—*Asterantheæ* Desf.

[6] *Granateæ* Don, *Edinb. N. Phil. Journ.* (1826) 134.—Endl. *Gen.* 1236.—H. Bn. *Payer Fam. Nat.* 371, Fam. 161.—*Lythrariacearum gen. anom.* B. H. *Gen.* 775, 784.

Eugenia in four. The genera *Decaspermum*, *Rhodomyrtus*, *Rhodamnia* and *Fenzlia* alone are limited to the tropical regions of Asia and Oceania. All the other genera of this series are exclusively American; but many of them, as *Psidium* and *Pimenta*, are cultivated in the old world. To the latter belong the *Barringtonieæ* with regular andrœcium, except *Gustavia* and *Grias* which, like the *Lecytheæ* with irregular andrœcium, are from tropical America. Of the two *Napoleoneæ* known, belonging each to a monotypal (?) genus, one is American and the other African. Finally, of sixty-four genera, nineteen are exclusively American; three only are common to the old and new world, viz.: *Myrtus*, *Eugenia*, and *Metrosideros*.[1]

AFFINITIES.—The *Myrtaceæ* have very numerous affinities, very close especially with the *Rhizophoraceæ*, chiefly with those of which the ovary is inferior. The number, ordinarily reduced, of the stamens and ovules, is chiefly what distinguishes the flowers of the latter, whilst the fruit is characterized by its structure and the mode of germination of its seed. The organs of vegetation are often the same in both families; but the *Myrtaceæ* have not the interpetiolate stipules of the *Rhizophoreæ*. The *Combretaceæ* with opposite leaves have sometimes the flower of the *Myrtaceæ*; but the unilocular ovary and the placentæ scarcely salient in its cavity easily distinguish them. The embryo is often constructed like that of the Pomegranates, the flower of which is quite different and has petals not without reason compared with those of the *Lythrariaceæ*. These latter have ordinarily a receptacular tube of special organization, and the calyx is most frequently valvate, like that of the Pomegranates; but we shall find that the ovary is generally free at the bottom of the receptacular tube, whilst in the Pomegranates, which have nearly the same perianth, the ovary is completely "adherent." The fruit, the seed and the embryo are equally different, and the opposite-leaved *Myrtaceæ* have ordinarily punctuate leaves. The *Melastomaceæ* are distinguished from the *Myrtaceæ*, either by the nervation of their leaves, or by the organization of their anthers, or by the relative position of the ovary in the receptacular cavity, or by all these characters united. The *Melastomaceæ* have besides almost always an indefinite number of stamens. Ordinarily, the *Myrtaceæ* are compared only with families with an inferior ovary; this is because it is not generally known that certain of them have an ovary almost completely superior, as is the case in several species of *Tristania* and *Metrosideros* of the section *Xanthostemon*. Then let the cells of this ovary be more or less incomplete, and the stamens united in fascicles; let the leaves also be opposite and punctuate, and it will be difficult to decide if the plants in which these characters are united belong to the *Myrtaceæ* or to the *Hypericaceæ*. The latter then may be defined, as we shall see, as *Myrtaceæ* with a superior ovary, and the same, consequently, may almost be said of the *Clusiaceæ*, which, as is known, it is very difficult to separate absolutely from the *Hypericaceæ*. We therefore place the *Myrtaceæ* at nearly an equal distance from the *Rhizophoraceæ*, the *Combretaceæ*, the *Lythrariaceæ*, the *Melastomaceæ*, and the *Hypericaceæ*.

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[1] Not to speak of *Punica*, which has doubtless been introduced into America, nor of the American *Schizocalyx* of BERG, a genus not adopted by all (B. H. *Gen.* 720, n. 59).

USES.[1]—These are very numerous, the *Myrtaceæ* being generally odorous plants, rich in stimulating, sometimes irritant essences, collected in numerous punctiform reservoirs scattered throughout the bark, the leaves and even certain parts of the flower and fruit. They are moreover tonic and astringent from the tannic matter contained in their bark, fruit, etc. Compared with this the wood is often inert and without medicinal properties; not that it is always inodorous. That of the American *Gustavia* is reported to have a cadaverous odour, and in *Fœtidia*[2] the smell is said to be intolerable. The wood of *Melaleuca* of the Indian Archipelago is often very hard and much employed in building. The first place is given to that of *M. Leucadendron*[3] and of *M. Cajeputi*.[4] In New Caledonia, the former, very abundant in fertile lands, furnishes the wood for all buildings and for a certain number of domestic purposes. The Australian *Tristania*, chiefly *T. neriifolia*,[5] has also excellent wood. In the island of Banca, that of *T. obovata* is employed for making charcoal.[1] *Callistemon salignus* also furnishes the Australians with an excellent wood for building. That of *Metrosideros vera* is one of the Iron woods of the Moluccas; it is highly resistant and said to be imperishable. In the South Sea islands the natives employ that of *M. polymorpha* Gaudich. for making charcoal; and that of a New Zealand species, *M. buxifolia*,[2] has received the name of *Lignum vitæ*. *M. stipularis*,[3] a Chilian species, has also a very useful wood. In New Caledonia, several species of *Metrosideros* of the section *Xanthostemon* are renowned for the hardness of their flexible wood, suitable for cartwright work, particularly *M. rubra*[4] and *pubescens*.[5] That of *M. pleurocalyptus*[6] is dense, red veined with black; that of *M. pancheri*, of a dark red colour, has a fine and hard grain. Two of the most beautiful *Myrtaceæ* of this country, remarkable for the qualities of their juice, have also an excellent wood. The first is *Arillastrum gummiferum*,[7] the fibrous bark of which is easily removed in large pieces, excellent for making huts and roofs. The wood is reddish, hard, fibrous, imperishable in water, esteemed for carpentry. In its fissures is sometimes deposited the dark and brittle gum which this tree produces naturally. The other is *Schizocalyx rubiginosa*,[8] the milky and sticky juice of which hardens in the air into a sort of gum, and the wood, which is of a beautiful violet-red colour, works very well. The trees of the *Leptospermeæ*, most remarkable in this respect, are, without doubt, the Eucalypts. Nearly all are Australian, and nearly all useful for their wood, which is often excellent for building, sometimes very hard, imperishable, and valuable for its rapid growth. Some species may be particularly mentioned as uniting most of these conditions. The best known, to which we shall return when we speak of the properties of its leaves, is certainly *E. Globulus* (fig. 299–303) or Blue Gum of Australia, but beside or above it we may mention, among others, *E. stellulata*, *coriacea*, *amygdalina*, *obliqua*, *leucoxylon*, *odorata*, *albens*, *siderophloia*, *robusta*, *viminalis*, *rostrata*, *resinifera*, *diversicolor*, *calophylla*, *citriodora*, *eximia*, *marginata*, etc., all most remarkable species, and many of which will be hereafter referred to as suitable for other uses.[1] There are many *Myrteæ* with useful wood, and first the common Myrtle, *Myrtus communis* (fig. 277–283), the aged stems of which are used for making small household objects; it is also employed in turnery. In tropical Asia that of *Eugenia malaccensis* is esteemed for making domestic articles, as also that of *E. lineata* and *linearis*, used in cabinet-work; that of *E. aromatica*, designated in Java under the name of Copper wood, and especially of the Clove (fig. 288, 289), which unfortunately does not attain large dimensions, but is useful for making small articles and boxes to preserve delicate objects. In South America a great many species of *Eugenia* are employed for their wood: *E. Luma* and *E. Temu*, Chilian species; *E. Pitra*, a species from the southern parts of the same country, etc. In New Caledonia, are noted as plants with useful wood, several species of *Eugenia*, lately described under the name of *Syzygium*,[2] chiefly *S. lateriflorum*, *multipetalum*, *nitidum*, *Pancheri*, *wagapense*, and a *Eugenia* (*Pteromyrtus*) designated by the name of *Caryophyllus pterocarpus*. *E. ovigera*,[3] of the same country, has a very hard wood with dark heart. *E. littoralis* has a remarkable wood for turnery and toy making. That of *E. Heckelii* is reddish, with a close grain; that of *E. Brackenridgei* A. Gray has also good qualities for joinery and cabinet-work. In this respect the colony[4] offers many useful products, not to speak of the xerocarpous Myrtaceæ mentioned above.

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[1] Endl. *Enchirid.* 652.—Lindl. *Veg. Kingd.* 736; *Fl. Med.* 73.—Guib. *Drog. Simpl.* ed. 6, iii. 268.—Rosenth. *Syn. Pl. Diaphor.* 919, 1131.

[2] Especially in *F. mauritiana* Commers.—Lamk. *Dict.* ii. 457; *Ill.* t. 419.—DC. *Prodr.* iii. 295 (*Bois puant*). This wood, according to report, has, besides, all the economic qualities of Walnut.

[3] See p. 345, note 8.

[4] Probably formed of one and the same polymorphous species (see p. 346, note 1).

[5] R. Br. *Ait. Hort. Kew.* ed. 2, iv. 417.—Benth. *Fl. Austral.* iii. 262.—*T. salicifolia* A. Cunn. *Bot. Reg.* sub n. 1839.—*Melaleuca neriifolia* Sims, *Bot. Mag.* t. 1058.—*M. salicifolia* Andr. *Bot. Repos.* t. 485.

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[1] From New Caledonia we derive a great part of the red woods, hard and close, of *T. capitellata* (*Tristaniopsis capitellata* Br. et Gr.;—Panch. et Séb. *Notice Bois Nouv.-Caléd.* 249: *Nouepou* of the natives) and of *T. Guillaini* (*Tristaniopsis Guillaini* Vieill.;—Panch. *op. cit.* 250).

[2] A. Cunn.—Hook. f. *Man. N.-Zeal. Fl.* 70. —*M. scandens* Banks (ex Hook. f.).

[3] Hook. f. *Fl. Antarct.* ii. 75.—*Myrtus stipularis* Hook. and Arn. *Bot. Misc.* iii. 316.—*Tepualia stipularis* Griseb. *Pfl. Phil. und Lechl. Abh. K. Ges. Wiss. Gœtt.* vi.

[4] *Fremya rubra* Br. et Gr. *Ann. Sc. Nat.* sér. 5, ii. 131.—Panch. *op. cit.* 252.

[5] *F. pubescens* Br. et Gr. *loc. cit.* 133.

[6] *Pleurocalyptus Deplanchet* Br. et Gr. *Nouv. Arch. Mus.* iv. t. 8; *Ann. Sc. Nat.* sér. 5, xiii. 387.—Panch. *op. cit.* 253.

[7] Panch. ex Br. et Gr. *Ann. Sc. Nat.* sér. 5, ii. 136; xiii. 376; *Bull. Soc. Bot. Fr.* x. 574.—*Spermolepis gummifera* Br. et Gr. *loc. cit.*—Panch. *op. cit.* 251 (*Chênegomme*).

[8] Br. et Gr. *Ann. Sc. Nat.* sér. 5, xiii. 380.—*Spermolepis rubiginosa* Br. et Gr. *Bull. Soc. Bot. Fr.* x. 574; *Ann. Sc. Nat.* sér. 3, ii. 136. Perhaps (see p. 359, note 10) this plant does not belong to the American *Schizocalyx*.—Panch. *op. cit.* 257 (vulg. *Gommier*). *Eugenia ovigera* Br. et Gr. (*Ann. Sc. Nat.* sér. 5, iii. 216, n. 5) appears to belong to the same genus as the preceding. Its hard wood, with red sap and black heart, is excellent also for cartwright work (Panch. *op. cit.* 258).

Barringtonia often has a soft and yielding wood. That of *B. alba*, however, is used in the Moluccas for cabinet-work; but that of *Lecythis* and the neighbouring genera is often of good and fine quality and renders great service to industry and domestic economy in the tropical regions of South America. Thus that of *L. Ollaria* (fig. 324), the trunk of which is said to be colossal, is used for building in Venezuela and Brazil; likewise, in Guyana, that of *L.*

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[1] See p. 346, note 5.

[2] Br. et Gr. *Ann. Sc. Nat.* sér. 5, iii. 221; xiii. 385.

[3] Congener (?) of *Schizocalyx*.

[4] See Panch. et Séb. *Notice Bois Nouv.-Caléd.* 254–259 (see p. 340, note 8).

amara, *grandiflora*. *Zabucayo* (fig. 325, 326), *Idatimon*, and, in Brazil, that of *L. Pisonis*, *grandifolia*, and *parvifolia*. The Brazilian *Couratouri* is useful for civil and naval construction; the wood is hard and resisting, particularly that of *C. estrellensis*, *Tanari*, *domestica*, and *legalis*. At Cayenne use is made for the same purposes of *C. guianensis*, of *Couroupita guianensis* (fig. 317–321), and of some neighbouring species. The wood of *Bertholletia excelsa* is also esteemed for building. That of the Pomegranates is not much used; it is however beautiful, easily polished, and pretty articles for the toilet and of fine cabinet-work are made of it.

The greater part of the *Myrtaceæ* mentioned above have many other uses. A large number owe it to an essence with which most of their organs are charged, especially the leaves and bark, and which renders them odorous, aromatic, stimulant. By distilling the leaves and flowers of the common Myrtle[1] (fig. 277–283), a cosmetic called *Eau d'ange* was formerly prepared. The fruit and leaves were then employed as tonics and stimulants. In Tuscany the seeds were used as pepper. All these parts were at the same time considered as slightly astringent, and in the south of Italy the leaves were even used for tanning.[2] Many Myrtles, from the abundance of their pungent essence, are employed as spices and condiments. One of the most noted in this respect is the Allspice (*Pimenta communis*[3]) of the Antilles, the very odorous fruit of which is exciting, aromatic, with a peppery flavour. From the leaves, an essence is also extracted, which is used for the same purposes as the pericarp, and has been substituted for the Clove; it is also employed in perfumery and medicine.[4] *P. acris*[5] has analogous properties and uses. Its bark is tonic, stomachic, digestive, and slightly astringent; it is employed as a condiment and often substituted for Cinnamon and Clove. The latter is the product of *Eugenia aromatica*[1] (fig. 288, 289), a native of the Moluccas, but now introduced and cultivated in the tropical regions of both worlds. The Clove, the part most used as spice and as medicine, it is the bud gathered before the expansion of the corolla. Its agreeable stimulating odour is very remarkable. It is used as a digestive, masticatory, odontalgic; an oil of cloves is obtained by distillation. The floral peduncles are also employed in perfumery. The fleshy and odorous fruit is used for the same purposes, and a preserve is made of it with sugar and with wine.[2] The buds of *Myrtus pseudocaryophyllus*[3] are employed for the same purposes in Mexico, but their properties are less energetic. A large number of other Myrtles have an odorous pungent bark, more or less astringent. We may mention *Calyptranthes aromatica*,[4] of Brazil, a substitute for cloves; *C. paniculata*,[5] serving the same purposes in Peru; *C. obscura*,[6] the fruit of which is sold in Rio Janeiro as aromatic and astringent; *C. Schlechtendaliana* and *Schiedeana*,[7] which plays the same part in domestic economy in Mexico; *Myrcia coriacea*,[8] of the Antilles, the leaves of which, with the odour of citron, are astringent, and employed as a hæmostatic, antidiarrhœtic, while the bark is used for dyeing brown and black; *Myrtus camphorata*,[9] of Chili, which yields by distillation an etherial essence, employed for the same purposes as Cajeput; *Eugenia Cheken*,[10] used in Chili in the treatment of diarrhœtic, rheumatic, and ophthalmic affections; *E. angustifolia*,[11] of the Antilles and Venezuela, the root and aromatic seeds of which are prescribed in the treatment of stomatites, and the bark of which is employed in the treatment of pains produced by the rough evening winds; *E. fragrans*,[1] of Jamaica, the aromatic leaves of which are recommended for pains and contusions; *E. disticha*,[2] the fruit and perfumed leaves of which bear the name of wild coffee in the Antilles; *E. glabrata*,[3] which, in the same islands, has a certain reputation as aromatic and acidulous; *E. variabilis*,[4] reputed in Brazil as salutary in cases of diarrhœa, flux, and vesical catarrh; *E. Vellozii*[5] and *Arrabidæ*,[6] which have a bark esteemed in the same country as aromatic and astringent; *E. dumetorum*,[7] having the same uses among the Cochinchinese; *E. caryophyllæa*,[8] reported to produce the bark introduced into Europe under the name of *Cassia caryophyllata*; *E. zeylanica*,[9] renowned as a stimulant, antirheumatic, and antisyphilitic; *E. guineensis* and *terebinthacea*, having a similar reputation in Senegal and at the Cape; *E. Jambos*[10] (fig. 286, 287), the bark of which is reputed in the Indian Archipelago as a good astringent; *E. lineata* and *linearis*, employed in Java for making gargles for the throat; *E. malaccensis*,[11] having all the properties of *E. Jambos*, as likewise *E. densiflora*[12] and *aquea*;[13] most of the Guyavas, which, in tropical America, have commonly the same uses; *Decaspermum rubrum*,[14] in Molucca applied to gum affections; *Myrtus ugni*,[15] an aromatic and stimulant species which the Chilians esteem in the form of tea, and *M. nummularia* and *microphylla*, also employed by them for the same purpose; *M. picro-*

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[1] *Myrtus communis* L. *Spec.* 673.—Gærtn. *Fruct.* i. 184, t. 38.—Lamk. *Ill.* t. 410.—Duham. *Arbr.* ed. 2, i. t. 43.—DC. *Fl. Fr.* iv. 426; *Prodr.* iii. 239, n. 5.—Gren. et Godr. *Fl. de Fr.* i. 602.—Guib. *Drog. Simpl.* éd. 6, iii. 271.—Lindl. *Fl. Med.* 75.—Rosenth. *Syn. Pl. Diaphor.* 934 (*Meurthe*, *Herbe du lagui*).

[2] This species with its numerous varieties (DC. *loc. cit.*), is noted as an ornamental and emblematic plant. The triumphers at Rome and the victors in the Isthmian games, were crowned with Myrtle. The fruit is tinctorial. In the south, hedges, arbours, baskets, etc., are made of Myrtle.

[3] Lindl. *Coll. Bot.* sub n. 19.—Berg, *Linnæa*, xxvii. 422.—Rosenth. *op. cit.* 936.—*P. vulgaris* Wight and Arn.—*P. aromatica* Kost.—? *Myrtus Pimenta* L. *Sp.* 676.—Sw. *Obs.* 202.—Sims, *Bot. Mag.* t. 1236.—Guib. *op. cit.* iii. 275, fig. 642.—*Eugenia Pimenta* DC. *Prodr.* iii. 285, n. 187.—Lindl. *Fl. Med.* 76 (*Grand Piment*, *Bois d'Inde*, *Piment couronné*, *P. des Anglais*, *de la Jamaïque*, *Jamaica pepper*, *Tête de clou*, *Pimento*, *Bayberry tree* of the English).

[4] It has been named *Carpobalsamum*.

[5] *Amomis acris* Berg, *Linnæa*, xxvii. 416.—Rosenth. *op. cit.* 935.—*Myrcia acris* DC. *Prodr.* iii. 243.—*Bot. Mag.* t. 3153.—*Myrtus acris* Sw. *Fl. Ind. Occ.* ii. 909.—Guib. *op. cit.* iii. 277, fig. 643.—*M. caryophyllata* Jacq. — *Eugenia acris* Wight and Arn. *Prodr.* i. 331.—Lindl. *Fl. Med.* 76.—*Caryophyllus racemosus* Mill. (*Poivre de Thevet*, *Nux caryophyllata* off.)

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[1] *E. caryophyllata* Thunb.—*Myrtus caryophyllus* Spreng. *Syst.* ii. 485.—*Caryophyllus aromaticus* L. *Spec.* 735.—Blackw. *Herb.* t. 338.—Hook. *Bot. Mag.* t. 2749.—DC. *Prodr.* iii. 262, n. 1.—Guib. *op. cit.* iii. 272, fig. 641.—Rosenth. *op. cit.* 925.—Berg. et Schm. *Off. Gew.* t. iii. *d* (*Bois de clous, Bois de Girofle*).

[2] *Clous-matrices, Mères de Girofle.*

[3] Gomez, *Mem. Acad. Lisb.* iii. 92.—*M. caryophyllata* Velloz.—*M. Oleaster* Mart.—*Eugenia Pseudocaryophyllus* DC.—*Pseudocaryophyllus sericeus* Berg. *Mart. Fl. Bras. Myrtac.* 429, t. 6, fig. 135, t. 47 *a*.—Rosenth. *op. cit.* 935 (*Craveiro, Cravo da terra*).

[4] A. S.-H. *Pl. Us. Bras.* t. 14; *Fl. Bras. Mer.* ii. 268.—DC. *Prodr.* iii. 258.—Rosenth. *op. cit.* 923.—Berg. *Mart. Fl. Bras. Myrtac.* 38 (*Cravo da terra*).

[5] R. et Pav. ex Rosenth. *op. cit.* 924.

[6] DC. *Prodr.* iii. 257 (not Mart.).—Berg. *Mart. Fl. Bras. Myrtac.* 52, n. 35 (*Pitanga de Cachorro*).

[7] Berg. ex Rosenth. *op. cit.* 924.—*Myrcia aromatica* Schlechtl (part).

[8] DC. *Prodr.* iii. 243, n. 2.—*Myrtus coriacea* Vahl, *Symb.* ii. 59.—*M. acris β* Sw. (not of others).

[9] *Myrceugenia camphorata* Berg.—Rosenth. *op. cit.* 929.

[10] Hook. and Arn, *Beech. Voy. Bot.* iii. 56.—C. Gay, *Fl. Chil.* ii. 390.—*Cheken* Feuill. *Obs.* iii. 45, t. 32.

[11] Lamk. *Dict.* iii. 203.—DC. *Prodr.* iii. 265, n. 18.—*Myrtus angustifolia* Spreng.

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[1] W. *Spec.* ii. 964.—DC. *Prodr.* n. 151.—Rosenth. *op. cit.* 927.—*Myrtus fragrans* Sw. *Fl. Ind. Occ.* 914.

[2] DC. *Prodr.* n. 96.—*M. disticha* Sw. *Fl. Ind. Occ.* 894.—Sims, *Bot. Mag.* t. 867.—Lindl. *Coll.* t. 19.—*M. horizontalis* Vent. *Malm.* t. 60.

[3] DC. *Prodr.* n. 97.—*Myrtus glabrata* Sw. *Fl. Ind. Occ.* 903 (not Bl.).

[4] Mart. ex Rosenth. *op. cit.* 928 (*Guabiroba*).

[5] Berg, *Mart. Fl. Bras. Myrtac.* 255, n. 110. —? *E. campestris* Velloz.

[6] Berg, ex Rosenth. *op. cit.* 928.—*E. crenata* Velloz.

[7] DC. *Prodr.* n. 184. — *Myrtus dumetorum* Poir.—*M. trinervia* Lour. (not Sm.).—*Nelitris trinervia* Spreng. *Syst.* ii. 488.

[8] *Syzygium* (?) *caryophyllæum* Gærtn.—DC. *Prodr.* n. 14.—Rosenth. *op. cit.* 930.

[9] *Syzygium zeylanicum* DC. *Prodr.* iii. 260, n. 15.—*S. Belluta* DC. *Prodr.* n. 26 ?—*Myrtus zeylanica* L. *Spec.* 675.

[10] L. *Spec.* 672.—*F. Jamboo* Roxb. *Cat. Hort. Calc.* 38.—*Myrtus Jambosa* H. B. K.—*Jambosa vulgaris* DC. *Prodr.* iii. 286, n. 1.—*Malacca-Schambu* Rheed. *Hort. Malab.* i. t. 17 (*Jamerosier, Jambosier domestique, Jamberosade, Pommier-rose*).

[11] L. *Spec.* 672.—Lamk. *Dict.* iii. 196.—Corr. *Ann. Mus.* ix. 292, t. 25, fig. 2. — *Jambosa Malaccensis* DC. *Prodr.* n. 6.—Hook. *Bot. Mag.* t. 4408.—*J. nigra* Rumph. *Herb. Amb.* i. t. 37, 38, fig. 1.—*Nati-Schambu* Rheed. *Hort. Malab.* i. t. 18.

[12] Bl. *Bijdr.* 1087.—*Jambosa densiflora* DC. *Prodr.* iii. 287, n. 13.—Rosenth. *op. cit.* 932 (*Jambon*).

[13] Roxb. *Cat. Hort. Calc.* 37.—Rumph. *Herb. Amb.* i. 126, t. 38, fig. 2.—DC. *Prodr.* n. 17.—*Cerocarpus aqueus* Hassk.

[14] *Nelitris rubra* Bl.—*Caryophyllaster ruber* Rumph. *N. alba* Bl. and *polygama* Spreng. have analogous properties.

[15] Mol. *Chil.* (éd. fr.) 133.—DC. *Prodr.* iii. 239, n. 9.—C. Gay, *Fl. Chil.* ii. 379.—*Eugenia Ugni* Hook. and Arn. *Bot. Misc.* iii. 318.—*Bot. Mag.* t. 4626 (*Uñi, Murtello*). The fruit is called *Murta*.

carpa and *amara*, of southern Brazil and La Plata, having aromatic-bitter properties; *M. depauperata*, a Brazilian species, the bark of which is used in the treatment of flux; *M. Pimenta*, *oblongata*, and *pimentoides*, of the Antilles, substitutes for *Pimenta acris* and *officinalis*; *Campomanesia cyanea*, *aurea*, *aprica*, *obversa*, and numerous other species,[1] which, in South America, are used for preparing stimulant, digestive, astringent, anticatarrhal, and other infusions; *C. triflora*,[2] in Para, often prescribed in the treatment of head affections, etc. etc.

Several xerocarpous Myrtaceæ have also medicinal properties, and nearly all are aromatic. *Leptospermum* is rich in odorous essence. One species, *L. flavescens*[3] (fig. 290–293), on that account and for its uses in Australia, has received the name of *L. Thea*.[4] In New Zealand, from *L. scoparium*,[5] Cook, in his celebrated voyage, prepared a theiform infusion for his crew, which preserved them from scurvy. *Bæckea frutescens*,[6] a native of south-eastern Asia, has numerous uses. Its branches and leaves placed upon clothes preserve them from the attacks of insects; it is also reputed a diuretic and abortive. *Melaleuca* is also very odorous; the oldest known is *M. minor*,[7] the principal of those which, in Java and the Moluccas, produce the oil of Cajeput. The latter is an essence, generally green, with a somewhat agreeable and very penetrating odour and acrid taste, employed from time immemorial, in Chinese India, internally and externally, for pains, rheumatism, nervous affections, malignant fevers, and cholera; it is an energetic stimulant, and also, it is said, a powerful analgesic. Numerous species sometimes distinguished from *M. Leucadendron*,[8] sometimes united with it as forms or varieties, such as *M. viridiflora*[1] or *Niaouli* of New Caledonia, abound in this country and the neighbouring isles, as far north as the Indian Archipelago. An essence is extracted from it having all the properties of Cajeput. *Melaleuca*, besides oil, bark, and leaves, furnishes the population of these isles with building timber and textile cortical fibre, and, in utility, is to this country what *Eucalyptus* is to Australia and Tasmania. At first the properties of only *E. Globulus*[2] (fig. 299–303), or Blue Gum of Tasmania, were known in Europe;[3] it grows also in the province of Victoria in Australia, and is one of the largest trees known, attaining a height of more than 230 feet. Although its growth is rapid, from 12 to 20 feet in a year, its wood is hard and imperishable. Its leaves are rich in essence and also in tannin. The essence, which is a sort of camphor, called *eucalyptol*, as also the powder, the alcoholic extract, and the distilled juice of the leaves, have a multitude of therapeutic uses, in the treatment of chronic affections of the bladder, of the bronchial tubes, of the digestive organs, of the joints, etc., and especially in fevers. From it are prepared pectoral and digestive infusions, lotions, sirrups, and pectoral sweetmeats; the leaves are smoked like tobacco. The uses of this[4] and of some other species,[5] already numerous, will probably be multiplied, when these trees, so useful for improving the salubrity of low and marshy countries, are introduced and planted in considerable numbers in the south of Europe and north of Africa, where they may attain the same development as in their native country. The Australian *Angophora* has nearly the same properties as *Eucalyptus*. *Metrosideros vera*[1] is reputed in the Moluccas to have analogous virtues. Besides a kind of iron-wood, a gum-resin little used, and an esteemed vegetable charcoal, it furnishes a bitter astringent bark, prescribed for catarrh and diarrhœa. The Pomegranate[2] (fig. 334–338), is also a very astringent plant. This property is especially marked in the pericarp,[3] which is used to tan skins and morocco leather, and which, with the salts of iron, produces an ink of good quality. It is also used for dyeing yellow. The bark of the stem is astringent, as likewise the buds and the flowers, formerly much employed in human and veterinary medicine. Its root especially is in repute as a cure for tapeworm, and has for half a century recovered the ancient renown it had for a time lost. Its bark is the most active part and is employed almost exclusively as an anthelminthic. The red sweet and acidulous part of the pomegranate which is eaten, and from which refreshing drinks are prepared, represents the exterior hypertrophiate and pulpy coat of the seed. In *Napoleona imperialis*[4] (fig. 329–333), there is likewise, under the bark of the fruit, a soft pulp enveloping the seeds,[5] which is eaten as refreshing in tropical western Africa. There are many sarcocarpous *Myrtaceæ* with edible fruit, and the cultivation among us of some Chilian species as fruit trees has been proposed. In Brazil are eaten the berries of *Eugenia inocarpa*, *Uvalha*, *Vauthieriana*, *Nhanica*, *dulcis*, *Guabiju*, *itacolumensis*, *pisiformis*, *Myrobalana*, *supra-axillaris*, *obovata*, *piriformis*, *variabilis*, *Vellosiana*, *Arrabidæ*,[6] *edulis*, *formosa*, *stricta*, *Lustchnatiana*,[7] *dasyblasta*, *sulcata*, *Pitanga*, *ligustrina*, *Michelii*, *brasiliensis*, *pseudo-Psidium*, *dysenterica*; in Guyana, the fruit of *E. stuposa*, *pumilo*, *Catinga*,[8] etc.; in Chili that of *E. Darwinii*, *apiculata*, *Luma*, *Temu*; in the Antilles, that of *E. Plumieri*, *cuneata*, *disticha*, *fragrans*, *lineata*, etc. Many species in Australia, India, Cochinchina, tropical Africa, and in the Polynesian isles, have likewise edible berries. The same is true of certain species of the Brazilian *Myrcia*, particularly of *M. trunciflora, edulis, Jaboticaba*,[1] etc. It is to the genus *Eugenia* that we have referred *Jambosa*, the fruit of which is so esteemed for its aroma, such as *J. vulgaris*[2] (fig. 286, 287), *domestica*, *aromatica*, *lineata*, *purpurascens*, etc.;[3] *Syzygium*, the berries of several of which are esteemed, for example, *S. zeylanicum*,[4] *Jambolana*,[5] *guineense*,[6] and many others;[7] *Jossinia*, which, chiefly *J. lucida*[8] and *mespiloides*,[9] are eaten in the Mascarene isles. *Marlieria tomentosa* and *glomerata*, Brazilian species, have also edible berries. But the most known of the *Myrtaceæ*, in this respect, are the Guyava trees, chiefly *Psidium pomiferum*[10] (fig. 284, 285) and *piriferum*,[11] *pumilum*, *coriaceum*, *albidum*, and a host of others,[12] often cultivated as fruit trees in most tropical regions. The Guyavas are sweet and refreshing; they are eaten raw or candied, and some of their varieties are highly esteemed in warm countries. Several species of *Myrtus*, *Campomanesia*,[13] etc., also produce alimentary fruits. Among the *Barringtoniæ*, the edible portion is more generally the embryo. It is for that that the seeds of *Careya arborea*[14] and of some species of *Lecythis* are sought. In other respects, the properties of the *Barringtonieæ*, especially of the *Lecytheæ*, are extremely diverse, and cannot be

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[1] See Rosenth. *op. cit.* 937.

[2] *Britoa triflora* Berg.—Rosenth. *op. cit.* 937 (*Ibobivaba*).

[3] Sm. *Trans. Linn. Soc.* iii. 262.—Benth. *Fl. Austral.* iii. 104.—*L. polygalifolium* Salisb. *Prodr.* 350.

[4] W. *Spec.* ii. 949.

[5] Forst. *Gen.* 36.—Hook. f. *Man. N.-Zeal. Fl.* 69.—*L. squarrosum* Gærtn.

[6] L. *Spec.* 514.—O b. *It.* 251, t. 1.—Sm. *loc. cit.* iii. 260.—DC. *Prodr.* iii. 229, n. 1.—Rosenth. *op. cit.* 923.—*B. chinensis* Gærtn. *Fruct.* i. 157, t. 31.

[7] Smith, *Rees Cyc p.* v. 23, n. 2.—DC. *Prodr.* iii. 212, n. 2.—Berg et Schm. *Darst. Off. Gew.* t. iii. c.—*M. Cajuputi* Roxb. *Cat. Hort. Calc.* 59.—Rosenth. *op. cit.* 920 (*Cajuputi*, *Caju-Kilæ* Rumph. *Herb. Amboin.* ii. 74, t. 17, fig. 1;—*Ballong* of the natives). Probably a variety of the following species.

[8] L. *Mantiss.* 105.—Lamk. *Ill.* t. 641, fig. 4.—DC. *Prodr.* n. 1.—Hayne, *Arzn. Gew.* 10, t. 9.—Mér. et Del. *Dict. Mat. Méd.* iv. 283.—Lindl. *Fl. Med.* 73; *Veg. Kingd.* 737.—Endl. *Enchirid.* 654.—Guib. *Drog. Simpl.* éd. 6, iii. 278, fig. 644.—F. Muell. *Fragm.* iv. 55.—Benth. *Fl. Austral.* iii. 142.—Hanb. et Flueck. *Pharmacogr.* 247.—*M. saligna* Bl. *Mus. Lugd.-Bat.* i. 66.—*Myrtus Leucadendron* L. fil. *Suppl.* 342.—*M. saligna* Gmel.—*Metrosideros albida* Sieb.—M. *coriacea* Spreng.—*Arbor alba* Rumph.

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[1] Gærtn. *Fruct.* i. 173, t. 35.—DC. *Prodr.* n. 3. [No distinct specific character separates this plant from the preceding; but Brongniart and Gris have retained it (*Ann. Sc. Nat.* sér. 5, ii. 139).]

[2] And these plants would doubtless still have been unknown in our country but for the energetic and patient initiative of P. Ramel, from whom it has been vainly sought to take away the merit of having propagated and brought under cultivation *E. Globulus* and many other species.

[3] Labill. *Voy.* i. 153, t. 13; *Pl. Nouv.-Holl.* ii. 121.—DC. *Prodr.* iii. 220.—Hook. f. *Fl. Tasm.* i. 133.—F. Muell. *Fragm.* ii. 68; *Pl. Vict.* Suppl. t. 16,—Benth. *Fl. Austual.* iii. 225 (*Blue Gum*).

[4] On *eucalyptol*, see Cloez (*Compt. Rend. Acad. Sc.* 28 mars 1870). Among other works on this plant, its uses and its products, see Ramel, *Rev. Marit. et Col.* (1870).—Gubler. *Bull. Thèrap.* (août 1871).—Bouillon, *Thès. Fac. Méd. Par.* (1872) n. 324.—Campion, *Thès. Fac. Méd. Par.* n. 395.—Debray, *Thès. Ec. Pharm. Par.* (1872).—Poli, *Sull' Eucalypto.* Intra (1874).—F. Muell. *N. Giorn. Ital.* v. 171.—De Hartzen, *Compt. Rend. Acad. Sc.* lxxi. 1248.—Pl. *Rev. des Deux Mondes*, vii. (1875) 149.—Hanb. et Flueck. *Pharmacogr.* 249.

[5] The most remarkable is doubtless *E. colossea*, the wood of which is excellent, and which attains a height of 400 or 500 feet. M. Ramel cultivates it already with great success in Algeria. *E. amygdalina, calophylla, cornuta, coriacea, Leucoxylon, siderophloia, Sideroxylon*, etc. etc., are also most useful plants. *E. resinifera* S. one of the red gum trees of Australia, yields a sort of kino and a saccharine product named Manna of New Holland. *E. dumosa* A. Cunn. and *mannifera* Mud. give a similar substance. *E. obliqua* Lhér. *Gunnii* Hook. *robusta* Sm. *gigantia* Hook. f. *piperita* Sm. are mentioned as having either an active essence, or a gummy or saccharine secretion, or a good wood. The wood of some species owes its solidity chiefly to deposits of calcareous and other salts in its tissue.

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[1] RUMPH. *Herb. Amboin.* iii. 16, t. 7.—LINDL. *Collect.* t. 18.—DC. *Prodr.* iii. 224, n. 1.—*Nani* VAL. *Æst. Ind.* 229, t. 35 (ex RUMPH.).—? *Opa Metrosideros* LOUR. *Fl. Cochinch.* (ed. 1790) 309. —*Nania vera* MIQ. *Fl. Ind.-Bat.* i. p. i. 399.—ROSENTH. *op. cit.* 922 (*Cây Boung Vâng* des Cochinch.).

[2] See p. 335, note 4.—GUIB. *op. cit.* iii. 280, fig. 645.—HAYNE, *Arzn. Gew.* x. 35.—BERG et SCHM. *Darst. Off. Gew.* t. iii. *a*, *b*.—HANB. et FLUECK. *Pharmacogr.* 257.

[3] *Malicorium* off.

[4] See p. 333, note 4.—ROSENTH. *op. cit.* 1137.

[5] It appears to depend upon the pericarp.

[6] See ROSENTH. *op. cit.* 926, 927.

[7] ROSENTH. 928 (*Phyllocalyx*).

[8] *Catinga moschata* AUBL. *Guian.* t. 203.

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[1] *Myrtus Jaboticaba* Velloz. *Fl. Flum.* v. t. 62.—Rosenth. *op. cit.* 924 (*Myrcia*).—Berg, *Mart. Fl. Bras. Myrtac.* 361.

[2] See p. 344, note 10.

[3] Rosenth. *op. cit.* 931.

[4] DC. *Prodr.* iii. 260, n. 15.—Rosenth. *op. cit.* 930.—? *S. Belluta* DC.—*Myrtus zeylanica* L. *Spec.* 675.—*Belluta Kannelli* Rheed. *Hort. Malab.* v. t. 20 (p. 344, note 9).

[5] DC. *Prodr.* n. 7.—Rosenth. *op. cit.* 930.—*S. caryophyllifolium* DC. *Prodr.* n. 9 (ex Berg). *Eugenia Jambolana* Lamk.—*Jambolifera pedunculata* Houtt. (ex DC.)—*Calyptranthes Jambolana* W.—*Jambolana* Rumph. *Herb. Amboin.* i. t. 42.

[6] DC. *Prodr.* n. 1.—*Calyptranthes guineensis* W. *Spec.* ii. 974.

[7] Particularly *S. terebinthaceum* Coop. of Madagascar and *pseudo-Jambolana* Miq. of Java.

[8] DC. *Prodr.* iii. 237, n. 2.—*Eugenia lucida* Lamk. *Dict.* iii. 203 (*Bois de clous*).

[9] DC. *Prodr.* n. 1.—*Eugenia mespiloides* Lamk. —*Myrtus mespiloides* Spr. (*Bois de Pêche marron, B. de Nèfle à grandes feuilles*).

[10] L. *Spec.* 672.—Tuss. *Fl. Ant.* ii. t. 22.—DC. *Prodr.* iii. 234.—*P. vulgare* Rich.—*Guayava piriformis* Gærtn. *Fruct.* i. t. 38 (*G. blanc, Poirier des Indes*).

[11] L. *Spec.* 672.—Descourt. *Fl. Ant.* ii. t. 72. —DC. *Prodr.* iii. 233, n. 10.—*Bot. Reg.* t. 1079. This species and the preceding have been united by Raddi [*Mem.* (1821) 2], under the name of *P. Guayava* (Berg, *Mart. Fl. Bras. Myrt.* 396, n. 34, t. 5, fig. 114). *P. Araça* Raddi (ex Berg, *loc. cit.* n. 35, fig. 113) is very near to it and has the same uses.

[12] *P. Guajabita* A. Rich. from Cuba (*Guajabita del Pinar*) and *P. densicomum* Mart. *cinereum* Mart. *cuneatum* Cambess. (*Araça*), *incanescens* Mart. *grandifolium* Mart. *Laruotteanum* Cambess. *microcarpum* Cambess. *rufum* Mart. *radicans* Berg (*Uvaca do campo*), and *montanum* Sw. from Jamaica (*Citronnelle, Almandron*). *P. Cattleyanum* (Sabine, *Trans. Hort. Soc.* iv. 315, t. 11; —Lindl. *Collect.* t. 16), valued for its edible fruit, is *P. variabile* Berg and *P. littorale* Raddi (*Araça de Praya*).

[13] Rosenth. *op. cit.* 937.

[14] Roxb. *Pl. Corom.* iii. 14, t. 218; *Fl. Ind.* ii. 638.—Rosenth. *op. cit.* 939.

stated in a general manner. *Gustavia speciosa*,[1] of Columbia, has a fruit reputed to be icteric. *G. superba*,[2] from the same country, and *G. fastuosa*,[3] from Guyana, are employed topically for liver complaints. *G. brasiliana*[4] has a bitter and aromatic root, prescribed for liver complaints and as a curative of abscesses. *Lecythis* has, not unfrequently, alimentary seeds: those of *L. Ollaria*[5] (fig. 324) furnish a useful oil. The liber is used for making a sort of paper and bands for tying up various objects, especially cigars. The seeds of *L. lanceolata*,[6] a native of Brazil, and transported thence to Madagascar and the Mascarene isles, has seeds rich in a fatty matter, used for preparing emulsions and in the treatment of affections of the urinary glands; they are narcotic. The seeds of *L. grandiflora* AUBL.[7] and *Pisonis* CAMB.[8] have similar qualities. *L. Zabucayo*[9] (fig. 325, 326), a species from Guyana, has a textile bark serviceable for making many articles of domestic use. *L. amara*, *Idatimon*, and *parviflora* AUBL., from the same country, have bitter seeds; only apes eat them. *L. parvifolia*[10] and *grandifolia*,[11] of Brazil, have the same uses as *L. Ollaria*. *Couroupita guianensis*[12] (fig. 317–321) attains great dimensions; but the wood is of little value, being wanting in solidity. The fruit is well known under the name of *Cannon ball fruit*;[13] the negroes eat the refreshing pulp and the seeds, vulgarly called *Andos almonds*. In Jamaica the fruit of

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[1] DC. *Prodr.* iii. 289.—LINDL. *Fl. Med.* 79.—*Pirigara speciosa* H. B. K. *Nov. Gen. et Spec.* vii. 200 (*Chupo*, *Chupa*). Children who eat its fruit are said to acquire a yellow tinge, lasting only one or two days.

[2] BERG, ex ROSENTH. *op. cit.* 939.—*G. augusta* DC. *Prodr.* n. 1.—*Pirigara superba* H. B. K. (*Membrico*, *Baco* of the Columbians).

[3] W. *Spec.* iii. 847.—DC. *Prodr.* n. 5.—BERG, *Mart. Fl. Bras. Myrt.* 473.—*G. hexapetala* SM. *Rees Cyclop.* n. 2.—*G. pterocarpa* POIT. *Mém. Mus.* xiii. t. 6, 7.—HOOK. *Bot. Mag.* t. 5239 (ex BERG).—*Pirigara hexapetala* AUBL. *Guian.* i. 490, t. 193.

[4] DC. *Prodr.* n. 6.—MART. *Mat. Med. Bras.* 72.—BERG, *loc. cit.* 472, t. 7, fig. 160.—*Janiparandiba* PIS. *Bras.* i. 121; ii. 172 (*Japoarandiba*, *Jandiparana*).

[5] L. *Spec.* 734.—DC. *Prodr.* iii. 291, n. 1 (excl. syn.).—ROSENTH. *op. cit.* 940.—? LŒFL. *It.* 159 (*Marmite de singe*, *Quatelé*).

[6] POIR. *Dict.* vi. 37.—MART. *Mat. Med. Bras.* 18.—DC. *Prodr.* n. 3.—BERG, *Mart. Fl. Bras. Myrt.* 482, n. 2, t. 7, fig. 156: 58.—*L. minor* VELLOZ. *Fl. Flum.* 222; v. t. 85 (not JACQ.).

[7] *Guian.* 712, t. 283–285.—DC. *Prodr.* n. 7 (*Canari-Macaque*, *Marmite de singe*).

[8] *A. S.-H. Fl. Bras. Mer.* ii. 272.—MART. *Mat. Med.* 17.—BERG, *Mart. Fl. Bras. Myrt.* 480, t. 62.—*L. Ollaria* VELLOZ. *Fl. Flum.* 222; v. t. 88 (not L.)—*Zapucaya* MARCGR. *Bras.* 128.—*Zabucayo* PISO, *Bras.* (ed. 1) 65.

[9] AUBL. *Guian.* 719, t. 284, 285 (part), 288.—DC. *Prodr.* n. 15.—ROSENTH. *op. cit.* 940 (*Quatelé*, *Zabucayo*).

[10] BERG, *Mart. Fl. Bras. Myrt.* 496, n. 27.—*Eschweilera parvifolia* MART.—DC. *Prodr.* iii. 293, n. 1 (excl. syn.).

[11] BERG, *loc. cit.* 494, n. 21, t. 73, fig. 1.—*Eschweilera grandifolia* MART.—DC. *loc. cit.* n. 2.

[12] AUBL. *Guian.* 708, t. 282.—DC. *Prodr.* iii. 294, n. 1.—TUSS. *Fl. Ant.* ii. 45, t. 10, 11.—TURP. *Dict. Sc. Nat.* Atl. t. 227–229.—DESCOURT. *Fl. Ant.* v. 340.—POIT. *Mém. Mus*, xiii. 152, t. 7.—ROSENTH. *op. cit.* 941.—*Lecythis bracteata* W.—*Pekea Couroupita* J.

[13] *Ape's apricot*, *Calebasse-colin*.

Grias cauliflora,[1] or *Anchovy pear*, is gathered before it is ripe and preserved with oil and with salt. *Bertholletia excelsa*[2] produces the *Brazil nut*[3] of commerce. These seeds (fig. 327, 328) are in shape that of a quarter of an apple, with hard rugose striated envelope, covering a large undivided edible embryo, rich in a sweet oil which soon turns rancid. The fibrous bark is useful, sometimes supplying the place of tow. Several *Barringtonias* yield useful products. *B. speciosa*[4] of tropical Asia, has oleaginous seeds and fruits[5] which are eaten green as vegetables. The Indians throw them into the rivers to intoxicate the fish. *B. racemosa*[6] (fig. 315, 316), an Asiatic and tropical oceanic species, has bitter aromatic astringent seeds, used in the treatment of affections of the skin, of the digestive organs, and of the liver. The bitter root is also prescribed for intermittent fevers. *B. rubra*[7] is a large Indian tree, the fruit of which has astringent qualities; the seeds and leaves, macerated in warm water, are likewise used in a similar manner. *B. coccinea*,[8] of India, Cochinchina, and the Moluccas, is edible; the young leaves are eaten cooked and in salad. Those of *B. alba*[9] are likewise eaten raw. The bark of this species is used for dyeing black.

The number of ornamental *Myrtaceæ* is considerable. The common Myrtle and the Pomegranate were long the only species of this family cultivated for decorative purposes. Later were introduced into our warm conservatories, specimens of *Eugenia*[10] (chiefly of the section *Jambosa*), *Pimenta*, then *Barringtonia*,[11] *Gustavia*,[12] and *Napoleona*, with rich foliage and brilliant flowers; and in our cool and temperate houses, several Myrtles[1] and *Metrosideros*,[2] the Guyavas, *Tristania* and *Eucalyptus*;[3] then a series of charming Australian plants, with foliage generally persistent, often ericoid, such as *Darwinia*,[4] *Verticordia*,[5] *Calythrix*, *Thryptomene*, *Bæckea*, *Leptospermum*, *Kunzea*, *Callistemon*, *Melaleuca*, *Beaufortia*, *Backhousia*, *Calothamnus*, *Regelia*. They were highly prized at the beginning of the century and cultivated in considerable number, as they are still in England, Germany, and Holland: the greater part are very suitable for the decoration of winter gardens; but many are difficult to preserve. *Eucalyptus*, which, in our conservatories, attains but little development, ornaments gardens and promenades in the south.

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[1] L. *Spec.* 732.—DC. *Prodr.* iii. 296.—Hook. *Bot. Mag.* t. 5622.—*Anchovy Pear* Sloan. *Hist. Jam.* ii. 122, t. 217.—P. Br. *Jam.* 245.—Lun. *Hort. Jam.* i. 19.

[2] H. B. *Pl. Æquin.* i. 122, t. 36.—Poit. *Mém. Mus.* xiii. 148, t. 4, 8.—DC. *Prodr.* iii. 293.—Schomb. *Proc. Hort. Soc.* i. 71, t. 3, 4.—Mart. *Reise*, iii. 1130, n. 11.—Guib. *Drog. Simpl.* éd. 6, iii. 271.—Mér. et Del. *Dict. Mat. Méd.* i. 579.—H. Bn. *Dict. Encycl. Sc. Méd.* ix. 182.—Berg. *Linnæa*, xxvii. 460; *Mart. Fl. Bras. Myrt.* 478, t. 60, 61 (*Yuvia, Nha, Nia, Tuca, Touka*).

[3] *Amandes d'Amérique, du Para, du Rio-Negro, du Rio-Grande, Castaños de Maranhão.*

[4] L. fil. *Suppl.* 312.—DC. *Prodr.* iii. 288, n. 1.—Rosenth. *op. cit.* 938.—*Butonica speciosa* Lamk. *Dict.* i. 521.—*Mitraria Commersoni* Gmel.—*Commersona* Sonner. *Voy. Guin.* i. 14, t. 8, 9.—*Butonica* Rumph. *Herb. Amboin.* iii. t. 114.

[5] Vulg. *Bonnets carrés.*

[6] Bl. ex DC. *Prodr.* n. 2; *V. Houtt. Fl. des Serr.* vii. 23, tab.—*Eugenia racemosa* L. *Spec.* 673.—*Samstravadi* Rheed. *Hort. Malab.* iv. t. 6.

[7] *B. acutangula* Gærtn. *Fruct.* ii. 97, t. 111.—Rosenth. *op. cit.* 1158.—*Eugenia acutangula* L. *Spec.* 673.—*Stravadia rubra* Pers.—*Stravadium rubrum* DC. *Prodr.* iii. 289, n. 2 (*Rosairo brava*).

[8] *B. excelsa* Bl. *Bijdr.* 1097 (ex DC.).—*Stravadium excelsum* DC. *Prodr.* n. 5.

[9] *Stravadium album* DC. *Prodr.* n. 1.—*Stravadia alba* Pers.—Seemann (*Fl. Vit.* 82) describes *B. edulis* as a species employed under the name of *Vutu Kana.*

[10] See *Bot. Mag.* t. 473, 4408, 4526, 4558, 4626, 5040, etc.

[11] V. Houtt. *Fl. des Serres*, vii. 21.

[12] *Bot. Mag.* t. 5069, 5239, 6151.

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[1] *Bot. Mag.* t. 250, 4558, 4809, etc.

[2] *Ibid.* t. 260, 4471, 4488, 4515.

[3] *Ibid.* t. 4333, 4637. — V. HOUTT. *Fl. des Serres*, xxi. 69.

[4] *Bot. Mag.* t. 4858, 4860, 5468.

[5] *Ibid.* t. 5286.

GENERA.

I. MYRTEÆ.

1. **Myrtus** T.—Flowers hermaphrodite regular; receptacle concave, turbinate or subcampanulate, scarcely or slightly produced beyond germen adnate within. Sepals 4, 5, marginally inserted, sometimes broadly foliaceous, somewhat imbricate or not contiguous and open. Petals 4, 5, alternate, imbricate, patent. Stamens ∞, inserted with perianth, ∞-seriate; filaments linear-filiform, sometimes complanate at base; anthers short, introrse, 2-rimose, either basifixed or versatile. Germen inferior; style filiform simple, at stigmatose apex not incrassate or more rarely capitellate; cells in germen 2-5, complete or incomplete at apex. Ovules in cells ∞, ∞-seriately inserted in internal angle of simple or 2-lamellate placenta, small, anatropous. Fruit baccate, crowned with persistent calyx or its scar, 1–∞-spermous. Seeds subreniform; testa membranous or osseous; radicle of hippocrepiform or somewhat involute embryo terete very long; cotyledons shorter or very small.—Trees or oftener shrubs, odorous, glabrous or pubescent; leaves opposite exstipulate penninerved, pellucid-punctulate, small or rather large, submembranous or coriaceous; flowers axillary pedunculate, solitary or cymose 3–7, more rarely ∞; the lateral oftener longer-pedicellate; bracteoles under the flower small or very small, more rarely broad foliaceous. (*South of Europe, western Asia, Oceania, south-west. and extra trop. America.*)—See p. 308.

2. **Rhodomyrtus** DC.[1]—Flowers of *Myrtus*; cells of germen 2–4, generally divided into 2 cellules by spurious vertical septa; each cellule divided between ∞ ovules by transverse septules[2] springing

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[1] *Mém. Myrtac.* 33; *Prodr.* iii. 240 (a sect. of *Myrtus*).—Salisb. ex DC. *loc. cit.*—Endl. *Gen.* n. 6316, *b.*—B. H. *Gen.* 713, n. 48.—Hook. *Fl. Ind.* ii. 469.

[2] Hardened in fruit.

from the placenta. Fruit baccate or subdrupaceous, divided into ∞ 1-spermous (sometimes pyreniform) cellules; seeds in cells solitary, subhorizontal suborbicular or reniform; embryo, etc., of *Myrtus*.—Trees or shrubs, villose or tomentose; leaves opposite, penninerved or 3-plinerved; flowers[1] axillary, solitary or 2, 3-nate, sometimes ∞, in rather long cymiferous raceme.[2] (*Trop. south. and east. Asia, Indian Archip.*[3])

3. **Decaspermum** Forst.[4]—Flowers nearly of *Myrtus*, hermaphrodite or polygamous, 4–5-merous; cells 4, 5, divided into 2 1- or pauciovulate cellules by spurious vertical centripetal septa. Fruit baccate, crowned with calyx, radiately septate; cellules 1-spermous; seeds, etc., of *Myrtus*.—Small trees or shrubs; leaves opposite penninerved; flowers axillary spuriously ramose; cymes sometimes in ramose foliate raceme.[5] (*Trop. Asia and Oceania.*[6])

4. **Pimenta** Lindl.[7]—Flowers nearly of *Myrtus*, 4–5-merous; germen 2, 3-celled. Ovules in cells few (2–4) or solitary, inserted under apex descending; micropyle superior lateral. Berry, etc., of *Myrtus*; embryo spirally involute, 1–2-cyclical.—Highly fragrant trees; leaves opposite coriaceous; flowers[8] in very compound ramose and many-flowered cymes axillary to uppermost leaves. (*Trop. America.*[9])

5. **Myrcia** DC.[10]—Flowers of *Pimenta* (or *Myrtus*), 5-merous or more rarely 3, 4-merous; cells of germen 2, 3 (or more rarely 4, 5), 2-ovulate. Ovules collaterally ascending. Fruit baccate, oftener crowned with persistent calyx and other characters of *Myrtus*; coty-

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[1] Rather large, showy, oftener pink.

[2] A genus scarcely distinct from *Myrtus*, with cells of germen transversely and vertically locellate.

[3] Spec. 4, 5. Wight, *Icon.* t. 522.—Miq. *Fl. Ind.-Bat.* i. p. i. 477.—F. Muell. *Fragm.* ii. 86, t. 13 (*Myrtus*).—Don, *Gen. Syst.* ii. 829 (*Nelitris*).—Benth. *Fl. Hongk.* 120; *Fl. Austral.* iii. 272.—Sims, *Bot. Mag.* t. 250 (*Myrtus*).

[4] *Char. Gen.* 73, t. 37 (1772).—J. *Gen.* 324, 453.—Poir. *Suppl.* ii. 459.—*Nelitris* Gærtn. *Fruct.* i. 134, t. 27 (1788).—DC. *Prodr.* iii. 231.—Endl. *Gen.* n. 6313.—B. H. *Gen.* 716, n. 52.—Hook. *Fl. Ind.* ii. 469.

[5] The name *Forsterianum* is certainly incorrect (since the number of seeds is very different), but having priority and in the absence of proof it must be retained.

[6] Spec. 4, 5. Wight, *Icon.* t. 521 (*Nelitris*).—A. Gray, *Unit. St. Expl. Exp. Bot.* i. 547, t. 60 (*Nelitris*).—Seem. *Fl. Vit.* 80 (*Nelitris*).—Miq. *Fl. Ind.-Bat.* i. p. i. 470 (*Nelitris*).—Benth. *Fl. Austral.* iii. 279 (*Nelitris*).—Walp. *Ann.* ii. 623; iv. 830 (*Nelitris*).

[7] *Collect.* sub n. 19.—Berg, *Linnæa*, xxvii. 422.—B. H. *Gen.* 717, n. 56.—*Amomis* Berg, *loc. cit.* 416.

[8] Small; often in 3-parous cymes.

[9] Spec. 2. L. *Spec.* 676 (*Myrs*). —Sw. *Obs.* 202 (*Myrtus*); *Fl. Ind. Occ.* ii. 909 (*Myrtus*).—DC. *Prodr.* iii. 243, n. 3 (*Myrcia*), 285, n. 181 (*Eugenia*).—*Bot. Mag.* t. 1236, 3153.

[10] *Dict. Cl. d'Hist. Nat.* xi.; *Prodr.* iii. 242.—Endl. *Gen.* n. 6317.—Spach, *Suit. à Buffon*, iv. 163.—B. H. *Gen.* 716, n. 53.—*Cerquieria* Berg, *Linnæa*, xxvii. 5.—*Gomidezia* Berg, *op. cit.* 6; xxix. 207.—*Calyptromyrcia* Berg, *Linnæa*, xxvii. 34.—*Aulomyrcia* Berg, *op. cit.* 35; xxix. 216; xxx. 654.—*Calycampe* Berg, *op. cit.* xxvii. 129.

ledons of rather large embryo contortuplicate.—Trees or shrubs; leaves opposite; flowers[1] cymose, few or oftener densely compound-cymose; bracteoles few, caducous or more rarely rather large foliaceous, persistent. (*Trop. and subtrop. America.*[2])

6. **Rhodamnia** Jack.[3]—Flowers of *Myrtus*, 4-merous; germen 1-locular. Ovules ∞, inserted on 2 parietal placentæ. Fruit baccate, crowned with calyx. Seeds ∞, often few; cotyledons of hippocrepiform embryo short. Other characters of *Myrtus*.—Small trees or shrubs; leaves opposite ovato-lanceolate, 3-nerved or 3-plinerved, sometimes white beneath; flowers[4] axillary fasciculate or more rarely solitary; bracteoles 2, small, caducous, inserted at top of pedicel. (*Trop. south-east. Asia, trop. east. Oceania.*[5])

7. **Fenzlia** Endl.[6]—Flowers nearly of *Myrtus*; receptacle ovoid, not produced beyond germen. Petals and stamens of *Myrtus*; anthers versatile. Germen 1–2-locular; ovules in cells 2, 3, subhorizontally superposed; style slender, apex small stigmatose. Fruit subglobular or ovoid, drupaceous, sparsely fleshy, crowned with open-reflexed calyx. Seeds 1, 2, enclosed singly in osseous endocarp; testa thin; embryo very long spirally rolled.—Shrubs cano-tomentellose; leaves opposite obtuse penninerved; flowers[7] axillary solitary pedunculate; bracteoles 2, linear-subulate inserted at top of peduncle. (*Australia.*[8])

8. **Feijoa** Berg.[9]—Flowers nearly of *Myrtus*; sepals 5, imbricate. Stamens ∞, ∞-seriate; filaments free short unequal, straight or some slightly incurved or inflexed in the bud, finally by anthesis elongate and far exserted, thickly subulate; anthers ovate introrse. Germen completely or incompletely 4-locular; placentæ 2-lamellate, sometimes free within. Ovules ∞, 2-seriate. Other characters of

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[1] Generally small.

[2] Spec. about 350. DC. *Mém. Myrtac.* t. 15.—H. B. K. *Nov. Gen. et Spec.* t. 544, 545 (*Myrtus*).—Field et Gardn. *Sert. Pl.* t. 75.—Miq. *St. Surin.* t. 9.—A. S. H. *Fl. Bras. Mer.* ii. t. 140 (?), 142–148.—Griseb. *Fl. Brit. W.-Ind.* 234.—Berg, *Mart. Fl. Bras. Myrt.* 9, t. 10 (*Cerquieria*); 11, t. 11, 12 (*Gomidezia*); 55, t. 18 (*Calyptromyrcia*), 59; t. 19, 20 (*Automyrcia*); 150, t. 23, 24.—*Bot. Mag.* t. 5790.—Walp. *Rep.* ii. 173, 932; v. 751; *Ann.* i. 314; ii. 628; iv. 833.

[3] *Mal. Misc.* i. (ex *Hook. Comp. to Bot. Mag.* i. 153).—Endl. *Gen.* n. 6338.—B. H. *Gen.* 714, n. 50.—Hook. *Fl. Ind.* ii. 468.—*Monoxora* Wight, *Ill.* ii. 12, t. 97*, fig. 5.

[4] Generally small.

[5] Spec. 5, 6. DC. *Prodr.* iii. 279, n. 136 (*Eugenia*).—Sm. *Trans. Linn. Soc.* iii. 280 (*Myrtus*).—Bl. *Bijdr.* 1983 (*Myrtus*).—F. Muell. *Fragm.* i. 76 (*Myrtus*).—Wight, *Icon.* t. 524.—Miq. *Fl. Ind.-Bat.* i. p. i. 478.—Benth. *Fl. Austral.* iii. 277; *Hook. Lond. Journ.* ii. 219 (*Monoxora*).—*Bot. Mag.* t. 3223 (*Eugenia*).—Walp. *Rep.* v. 757; *Ann.* ii. 627; iv. 833.

[6] *Atakta*, 19, t. 17, 18; *Gen.* n. 6274 (*Olinieæ*).—B. H. *Gen.* 715, n. 51.

[7] Moderate, pink.

[8] Spec. 2. Benth. *Fl. Austral.* iii. 278.

[9] *Linnæa*, xxix. 258.—B. H. *Gen.* 712, n. 42 *Orthostemon* Berg, *Linnæa*, xxvii. 440; *Mart Fl. Bras. Myrt.* 467, t. 7, fig. 158, t. 54 (not R Br.).

Myrtus or *Psidium*. Fruit baccate oblong, crowned with persistent calyx; "seeds angular albuminous; cotyledons of straight embryo foliaceous flat; radicle elongate."[1] A shrub; leaves opposite coriaceous penninerved, nitid above, cano-tomentose below; flowers[2] pedunculate, few at summit of ramules, but "finally growing laterally from branch." (*Brazil.*[3])

9? **Marlieria** Camb.[4]—Flowers nearly of *Myrtus* (or *Myrcia*); receptacular tube produced beyond germen adnate within. Calyx closed in bud or slightly open at apex and 4–5-lobed (*Rubachia*[5]), oftener at anthesis disruptly 4–5-lobed. Petals 4, 5, or more rarely 0. Stamens ∞, ∞-seriate; anthers versatile. Germen 2–4-locular; ovules in cells 2, ascending. Fruit, sometimes crowned with base of calyx, etc., of *Myrtus*; cotyledons of incurved embryo contortuplicate.—Trees or shrubs; leaves and inflorescence of *Myrcia*.[6] (*Trop. and subtrop. America.*[7])

10. **Calyptranthes** Sw.[8]—Flowers nearly of *Myrtus* (or *Marlieria*); calyx turbinate, closed in bud, finally at anthesis, circumscissus at base and calyptrately deciduous. Petals 1–5, small, very small (or 0). Ovules in 2, 3 cells of germen 2 or more rarely ∞ (*Mitranthes*[9]). Fruit baccate, seed, etc., of *Myrtus*; cotyledons of incurved embryo contortuplicate.—Trees and shrubs; leaves and inflorescence of *Myrcia*. (*Trop. America.*[10])

11. **Campomanesia** R. & Pav.[11]—Flowers nearly of *Calyptranthes*; calyx 5-lobed or more rarely 4–6-lobed, sometimes patelliformly dilated at base (*Paivæa*[12]); lobes either conspicuous rather obtuse, or

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[1] Character of seed from Berg, *loc. cit.*

[2] Rather large showy; stamens coloured.

[3] Spec. 1. *F. Sellowiana* Berg.—*Orthostemon Sellowianus* Berg.—*O. obovatus* Berg, *loc. cit.*

[4] *A. S.-H. Fl. Bras. Mer.* ii. 373, t. 156.—Spach, *Suit. à Buffon*, iv. 183.—Endl. *Gen.* n. 6318.—H. Bn. *Payer Fam. Nat.* 364.—B. H. *Gen.* 716, n. 54.

[5] Berg, *Linnæa* xxvii. 11; xxix. 209.—*Eugeniopsis* Berg, *Linnæa* xxvii. 80; xxix. 219; xxx. 665; xxxi. 249.

[6] A genus between *Myrcia* and *Calyptranthes*, differing only in the calyx.

[7] Spec. about 35. Griseb. *Fl. Brit. W.-Ind.* 233.—Berg, *Mart. Fl. Bras. Myrt.* 28, t. 13 (*Rubachia*); 31, t. 14, 15; 143, t. 21, 22 (*Eugeniopsis*).—Walp. *Rep.* ii. 177.

[8] *Prodr.* 80; *Fl. Ind. Occ.* 917, t. 15.—DC. *Prodr.* iii. 265.—Spach, *Suit. à Buffon*, iv. 168.—Endl. *Gen.* n. 6319.—B. H. *Gen.* 717, n. 55.—H. Bn. *Payer Fam. Nat.* 367.—*Chytraculia* P. Br. *Jam.* 239.—*Zuzygium* P. Br. *loc. cit.* 240 (ex Endl.).—*Chytralia* Adans. *Fam. des Pl.* ii. 80.—*Calyptranthus* J. *Dict. Sc. Nat.* vi. 274 (not Bl.).

[9] Berg, *Linnæa*, xxvii. 316; xxix. 248; xxx. 700.

[10] Spec. about 70. A. S.-H. *Pl. Us. Bras.* t. 14; *Fl. Bras. Mer.* ii. t. 155.—Seem. *Fl. Vit.* 81.—Griseb. *Fl. Brit. W.-Ind.* 232.—Berg, *Mart. Fl. Bras. Myrt.* 38, t. 16, 17; 354, t. 33 (*Mitranthes*).—Walp. *Rep.* ii. 178; v. 752; *Ann.* ii. 629.

[11] *Prodr. Fl. Per.* 72, t. 13; *Syst.* 128.—DC. *Prodr.* iii. 232.—Spach, *Suit. à Buffon*, iv. 151.—Endl. *Gen.* n. 6314.—B. H. *Gen.* 712, n. 43.—*Britoa* Berg, *Linnæa*, xxvii. 435; xxix. 257.—*Lacerdæa* Berg, *Linnæa*, xxx. 713.—*Abbevillea* Berg, *Linnæa*, xxvii. 425; xxix. 256; xxxi. 260 (calyx generally larger and more expanded).

[12] Berg, *Mart. Fl. Bras. Myrt.* 614.—B. H. *Gen.* 712, n. 44 (spec. 1, according to authors cited generically distinct).

very small or subnil in bud; limb at anthesis often longitudinally fissus between lobes. Petals 4–6, patent. Stamens ∞, ∞-seriate; anthers ovate or oblong, sometimes apiculate (*Acrandra*[1]). Germen 4–10-locular; ovules ∞, inserted on 2-lamellate or little prominent subpeltate placenta; style simple, capitate or oftener peltate at stigmatose apex. Berries, etc., of *Myrtus*; embryo elongate and spirally involute; radicle very elongate; cotyledons rather short.—Trees or shrubs; leaves opposite penninerved; flowers axillary, solitary, few or ∞ cymose. (*Trop. and subtrop. America.*[2])

12. **Psidium** L.[3]—Flowers nearly of *Campomanesia*; receptacle campanulate or piriform. Calyx closed in bud, sometimes crowned with foliaceous lobes (*Psidiopsis*[4]); lobes oftener 4, 5, before anthesis short, wide (or 0); at anthesis often fissus or disrupted to the base. Petals 4, 5. Stamens ∞; anthers oblong or narrow linear. Germen 2–8-locular; style at apex peltate or capitate; ovules ∞, inserted on entire, subpeltate or 2-lamellate placenta. Berry various in form, crowned with persistent calyx or its scar. Seeds ∞, reniform; testa thick hard; embryo curved or hippocrepiform, sometimes cyclical; radicle elongate; cotyledons small.—Trees or shrubs rarely undershrubs, glabrous or oftener tomentose; leaves opposite penninerved; flowers[5] axillary or lateral, solitary or 3–∞ cymose, 2-bracteolate. (*Trop. and subtrop. America.*[6])

13. **Myrrhinium** Schott.[7]—Flowers nearly of *Myrtus*, 4-merous; stamens 4, alternipetalous, or 5–8, in pairs; filaments[8] very long, 2-plicate in bud; anthers introrse. Germen 2-locular, style elongate,

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[1] Berg, *Linnæa*, xxvii. 435.

[2] Spec. about 60. H. B. K. *Nov. Gen. et Sp.* vi. 150, t. 147.—A. S.-H. *Fl. Bras. Mer.* ii. t. 139 (*Psidium*). — Lindl. *Collect.* 16.—Griseb. *Fl. Brit. W.-Ind.* 242.—Berg, *Mart. Fl. Bras. Myrt.* 430, t. 48 (*Abbevillea*); 438, t. 49, 50; 459, t. 51, 52 (*Acrandra*); 461, t. 53 (*Britoa*); 464 (*Lacerdæa*).—Walp. *Rep.* ii. 170, 932; v. 750.

[3] *Gen.* n. 615.—J. *Gen.* 324, 453.—Lamk. *Dict.* iii. 16; Suppl. ii. 824; *Ill.* t. 416.—DC. *Prodr.* iii. 232.—Spach, *Suit. à Buffon*, iv. 152.—Endl. *Gen.* n. 6315.—H. Bn. *Payer Fam. Nat.* 364.—B. H. *Gen.* 713, n. 45.—Hook. *Fl. Ind.* ii. 467.—*Guaiava* T. *Inst.* 660, t. 443.—Gærtn. *Fruct.* i. 185, t. 38.—*Burchardia* Neck. *Elem.* n. 728.—*Acca* Berg, *Linnæa*, xxvii. 138.—*Calyptropsidium* Berg, *loc. cit.* 349.

[4] Berg, *Linnæa*, xxvii. 350,—B. H. *Gen.* 713, n. 46.

[5] Rather large showy, or small.

[6] Lamb. *Trans. Linn. Soc.* xi. t. 17.—Benth *Fl. Hongk.* 120.—Griseb. *Fl. Brit. W.-Ind.* 241 —Miq. *Fl. Ind.-Bat.* i. p. i. 468.—A. S.-H. *Fl Bras. Mer.* ii. t. 136–138.—Berg, *Mart. Fl. Bras Myrt.* 381, t. 41, 42.—*Bot. Reg.* t. 622, 653, 1079 —*Bot. Mag.* t. 1779, 2501. — Walp. *Rep.* ii 170; v. 750; *Ann.* ii. 624; iv. 831.

[7] *Spreng. Syst. Cur. Post.* 404.—Endl. *Gen* n. 6273.—B. H. *Gen.* 717, n. 57.—*Felician* Cambess. *A. S.-H. Fl. Bras. Mer.* ii. 375, t. 157 —Spach, *Suit. à Buffon*, iv. 184.—*Tetrastemon* Hook. et Arn. *Bot. Misc.* iii. 317.

[8] Dense red, very conspicuous.

plicate in bud, scarcely capitellate at stigmatose apex. Ovules in cells ∞, peltately inserted in rays on orbicular 2-lamellate placenta. Berry ovoid, crowned with calyx; seeds 1, 2, curved or cochleate; embryo conformably curved; radicle longer than indistinct cotyledons. —A small tree or shrub; leaves opposite, penninerved nitid; stipules (?) setaceous very small, caducous; flowers in 2-parous cymes springing from the wood; lateral pedicellate. (*Subtrop. S. America.*[1])

14. **Eugenia** Micheli.[2]—Flowers of *Myrtus*; receptacle globose, ovoid, obconical, turbinate or tubular (*Caryophyllus*[3]), long attenuate at base (*Clavimyrtus*,[4] *Cuphœanthus*[5]), externally either glabrous, or angular or thickly alate (*Pteromyrtus*[6]). Sepals 5, or oftener 4, imbricate or more or less widely foliaceous (*Phyllocalyx*[7]), rarely very short dentiform. Petals 4, 5, or very rarely 6–∞ (or 0), sometimes more or less connate in a hood (*Syzygium*[8]), sometimes thick coriaceous, deciduous. Stamens ∞ (of *Myrtus*), or free, or obscurely 4–5-adelphous in bud (*Caryophyllus*); anthers often versatile; cells parallel or rarely divaricate. Germen inferior, 2- or very rarely 3-locular; style slender, scarcely or not at all incrassate at stigmatose apex. Ovules in cells ∞, rarely 2–4 (*Myrciaria*[9]). Fruit baccate (sometimes (?) drupaceous), rarely coriaceous or corticate. Seeds generally 1, or few, variously inserted, globose, ovoid or variously compressed and angular; cotyledons of fleshy exalbuminous (some-

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[1] Spec. 1. *M. atropurpureum* Schott.—Mart. *Nov. Gen. et Spec.* iii. 173, t. 291; *Flora*, xx. Beibl. ii. 90.—Berg, *Linnœa*, xxvii. 437; *Mart. Fl. Bras. Myrt.* 465.—*M. rubriflorum* Berg, *Mart. Fl. Bras. Myrt.* 466, t. 7, fig. 164.—*Tetrastemon loranthoides* Hook. et Arn. *loc. cit.*

[2] *Nov. Gen.* 226, t. 108.—L. *Gen.* n. 616.—J. *Gen.* 324.—Lamk. *Dict.* iii. 196; Suppl. iii. 121; *Ill.* t. 418.—DC. *Prodr.* iii. 262.—Spach, *Suit. à Buffon*, iv. 174.—Endl. *Gen.* n. 6323.—A. Gray, *Unit. St. Expl. Exp. Bot.* i. 514, t. 60.—B. H. *Gen.* 718, 1006, n. 58.—H. Bn. *Payer Fam. Nat.* 364.—Baker, *Fl. Maurit.* 112.—Hook. *Fl. Ind.* ii. 470.—*Catinga* Aubl. *Guian.* 511, t. 203.—*Guapurium* J: *Gen.* 324.—*Greggia* Gærtn. *Fruct.* i. 168, t. 38.—*Jossinia* Commers. ex DC. *Prodr.* iii. 337.—*Syllysium* Mey. et Schau. *Nov. Act. Nat. Cur.* xix. Suppl. 334 (incl.: *Acmena* DC. *Caryophyllus* L. *Clavimyrtus* Bl. *Cuphœanthus* Seem. *Jambosa* DC. *Myrciaria* Berg, *Opa* Lour. *Syzygium* Gærtn.).

[3] T. *Inst.* 432.—L. *Gen.* n. 669.—J. *Gen.* 324.—Lamk. *Dict.* ii. 718; *Ill.* t. 417.—Gærtn. *Fruct.* i. t. 33.—DC. *Prodr.* iii. 261.—Spach, *Suit. à Buffon*, iv. 171.—Endl. *Gen.* n. 6321.

[4] Bl. *Mus. Lugd.-Bat.* i. 113, t. 49.—*Macromyrtus* Miq. *Fl. Ind.-Bat.* i. p. i. 439.

[5] Seem. *Fl. Vit.* 76.—B. H. *Gen.* 724, n. 74.—*Gaslondia* Vieill. *Bull. Soc. Linn. Norm.* x. 96.—B. H. *Gen.* 1006, n. 77.

[6] Cuj. typ. *Caryophyllus pterocarpus* Vieill. Herb. ex Br. et Gr.—*Syzygium pterocalyx* Br. et Gr. *Ann. Sc. Nat.* sér. 5, xiii. 386.

[7] Berg, *Linnœa*, xxvii. 306; xxix. 245.—? *Plinia* L. *Gen.* n. 671.—*Stenocalyx* Berg, *Linnœa*, xxvii. 309.—*Hexachlamys* Berg, *loc. cit.* 345.

[8] Gærtn. *Fruct.* i. 166, t. 33.—DC. *Prodr.* iii. 259.—Spach, *loc. cit.* 170.—Endl. *Gen.* n. 6320.—*Acmena* DC. *Prodr.* iii. 262.—Spach, *loc. cit.* 170.—Endl. *Gen.* n. 6322.—*Microjambosa* Bl. *Mus. Lugd.-Bat.* i. 117.

[9] Berg, *Linnœa*, xxvii. 320; xxix. 249; xxx. 702; xxxi. 259; *Mart. Fl. Bras. Myrt.* 358, t. 36, 37.—*Siphoneugenia* Berg, *Linnœa*, xxvii. 344; *Mart. Fl. Bras. Myrt.* 378, t. 38.

times multiple[1]) embryo thick plano-convex, hemispherical or ellipsoid,[2] sometimes unequal; radicle short straight or incurved more or less incumbent.—Trees or shrubs; leaves opposite[3] penninerved, sometimes membranous, often coriaceous and other characters of *Myrtus*; flowers[4] axillary solitary or in cymes or short raceme;[5] inflorescence either centrifugal (*Jambosa*[6]), or centripetal (*Eugeniastrum*[7]); bracts and bracteoles oftener small and caducous. (*All trop. and subtrop. regions.*[8])

15. **Acicalyptus** A. Gray.[9]—Flowers nearly of *Eugenia*; receptacle tubular clavate. Calyx gamophyllous entire conical, circumscissus at base deciduous. Petals 4, free or coherent, deciduous. Stamens germen, etc., of *Eugenia*; ovules ∞, incurved anatropous. Fruit fleshy (?).—Glabrous trees or shrubs; leaves of *Eugenia*; flowers in subcorymbose cymes at apex of ramules. (*New Caledonia, Viti Isles.*[10])

16? **Piliocalyx** Br. & Gr.[11]—Flowers nearly of *Acicalyptus*; receptacle shorter. Calyx calyptrately deciduous. Petals small unequal, more or less adherent. Germen 2-locular; ovules in cells ∞ (4–10), descending from apex of internal angle, orthotropous; micropyle inferior. Fruit fleshy; seeds . . . ?—Trees or shrubs; leaves opposite or subopposite; flowers in terminal compound cymes. (*New Caledonia.*[1])

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[1] In *E. Jambosa* we have often seen embryos.

[2] Sometimes conferruminate or unequal heteromorphous.

[3] Or sometimes (?) it is said, alternate.

[4] Often rather large, showy, white, pink, or more rarely pale yellow.

[5] By defect of bractiferous leaves.

[6] Rumph. *Herb. Amb.* i. 121.—DC. *Prodr.* iii. 286.—Spach, *Suit. à Buffon*, iv. 179.—Endl. *Gen.* n. 6324.—*Cerocarpus* Hassk. *Cat. Hort. Bog.* 262.—*Gelpkea* Bl. *Mus. Lugd.-Bat.* i. 88, t. 35. —*Strongylocalyx* Bl. *loc. cit.* 89, t. 54.—*Cleistocalyx* Bl. *loc. cit.* 84, t. 56.

[7] Griseb. *Fl. Brit. W.-Ind.* 236.

[8] Spec. about 500. H. B. K. *Nov. Gen. et Spec.* t. 546 (*Myrtus*).—Lindl. *Collect.* t. 19 (*Olinthia*), —Wight, *Ill.* 13, 14 (*Jambosa*), 15 (*Syzygium*); *Icon.* t. 100, 553, 545, 551; 73, 216, 525–530, 546, 548–550, 608–813 (*Jambosa*); 531–536, 538–544 (*Syzygium*).—Wall. *Pl. As. Rar.* t. 161 (*Jambosa*).—DC. *Dict. Hist. Nat.* xi. (*Acmena*); *Mém. Myrtac.* t. 16–19 (*Syzygium*), 20–23.—Guillem. et Perr. *Fl. Sen. Tent.* i. t. 72 (*Syzygium*).—Kl. *Pet. Moss. Bot.* t. 11 (*Syzygiam*).—Harv. and Sond. *Fl. Cap.* ii. 522.—A. Gray, *Unit. St. Expl. Exp. Bot.* i. 510, t. 58, 59 (*Jambosa*); 514, t. 60; 518, t. 61–65 (*Syzygium*).—Seem. *Fl. Vit.* 76, 81 (*Calyptranthes*), t. 15 (*Jambosa*), t. 16 (*Syzygium*).—Miq. *Fl. Ind. Bat.* i. p. i. 440, 446 (*Syzygium*),—Thw. *Enum. Pl. Zeyl.* 114, 115 (*Jambosa*), 116 (*Syzygium*), 118 (*Acmena*).—Griseb. *Fl. Brit. W.-Ind.* 235 (*Caryophyllus, Syzygium, Jambosa*), 236 (*Eugenia*).—Hook. f. *Handb. N.-Zeal. Fl.* 74.—Benth. *Fl. Hongk.* 118 (*Syzygium*), 119 (*Acmena*), 120 (*Jambosa*); *Fl. Austral.* iii. 280.—Br. et Gr. *Ann. Sc. Nat.* sér. 5, iii. 215, 219 (*Jambosa*), 221 (*Syzydium*), 224 (*Caryophyllus*); xiii. 385 (*Syzygium*).—F. Muell. *Fl. Vict.* t. suppl. 18 (*Syzygium*).—*Bot. Reg.* t. 627, 1033 (*Jambosa*).—*Bot. Mag.* t. 473 (*Plinia*), 867, 1696, 2230 (*Jambosa*), 4558 (*Jossinia*), 4526, 4626, 5040, 5480 (*Acmena*). —Walp. *Rep.* ii. 172 (*Jossinia*), 178 (*Calyptranthes, Syzygium*), 181 (*Acmena*), 191 (*Jambosa*); v. 751 (*Syllysium*), 752 (*Calyptranthes, Syzygium*); *Ann.* ii. 626 (*Jossinia*), 629 (*Calyptranthes, Syzygium*), 630 (*Gelpkæa*), 631, 632 (*Jambosa*), 639 (*Clavimyrtus*), 640 (*Microjambosa*); iv. 832 (*Jossinia*), 833 (*Syzygium*), 839 (*Caryophyllus*), 840 (*Acmena*), 841 (*Jambosa*), 849 (*Macromyrtus*).

[9] *Unit. St. Expl. Exp. Bot.* i. 551, t, 67; *Bonplandia* (1862), 35.—B. H. *Gen.* 708, n. 31.

[10] Spec. about 3. Br. et Gr. *Ann. Sc. Nat.* sér. 5. iii. 227.—Walp. *Ann.* iv. 853.

[11] *Ann. Sc. Nat.* sér. 5, iii. 225; *Nouv. Arch. Mus.* iv. 26, t. 10.—B. H. *Gen.* 1006, n. 78.

17 ? **Aulacocarpus** Berg.[2]—Flowers . . . ? "Fruit drupaceous depressed globose, crowned with 5-fid calyx, 1–5-pyrenous. Seeds in subligneous pyrenes solitary obovoid; testa thick; embryo of *Eugenia.*"—Trees or shrubs; leaves opposite wide penninerved; fruit axillary glomerate, shortly pedicellate.[3] (*Trop. America.*[4])

18 ? **Calycorectes** Berg.[5]—Flowers nearly of *Eugenia*; calyx subconical, valvate, hiant at apex, 4–6-fid. Stamens ∞, inserted higher than germen in receptacle dilated to cupule, and there ∞-seriate. Germen adnate within to bottom of turbinate receptacle; cells 2, ∞-ovulate. Fruit baccate, crowned with persistent calyx; seeds, embryo,[6] etc., of *Eugenia.*—Trees or shrubs; leaves opposite penninerved; flowers axillary solitary or cymose, variously pedicellate.[7] (*Trop. America.*[8])

19 ? **Shizocalyx** Berg.[9]—Flowers nearly of *Calycorectes*; receptacle very concave, produced higher above germen in cupule and bearing higher ∞ stamens ∞-seriately inserted. Sepals 4, 5, tomentose without, imbricate at free apex and there as also in bud somewhat open. Germen 2-locular and other characters of *Calycorectes.* Fruit . . . ?—Trees; leaves opposite, oftener tomentose, penninerved; flowers axillary pedunculate solitary; peduncles 2-bracteolate. (*Brazil, New Caledonia ?*[10])

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[1] Spec. 3, 4.

[2] *Linnæa*, xxvii. 345.—B. H. *Gen.* 720, n. 60.

[3] A doubtful genus, perhaps only a section of *Eugenia*, with fruit sometimes (?) drupaceous.

[4] Spec. about 2. Benth. *Sulph.* t. 37 (*Campomanesia*).—Griseb. *Fl. Brit. W.-Ind.* 239; *Cat. Pl. Cub.* 90.—Berg, *Mart. Fl. Bras. Myrt.* 380, t. 40.

[5] *Linnæa*, xxvii. 317; xxix. 249; xxx. 701; *Mart. Fl. Bras. Myrt.* 356, t. 34.—B. H. *Gen.* 720, n. 59.

[6] Known in one species (Berg).

[7] Perhaps a section of *Eugenia* (B. H.).

[8] Spec. enumerated, 6, 7.

[9] *Linnæa* xxvii. 319; *Mart. Fl. Bras. Myrt.* 357, t. 35.

[10] The Brazilian species *S. Pohlianus* Berg, by more recent authors referred to *Calycorcetes* (B. H. *Gen.* 720), but differs particularly in the æstivation of the calyx. Is the south Caledonian species *S. rubiginosa* Br. et Gr. (*Ann. Sc. Nat.* sér. 5, xiii. 378), the *Spermolepis rubiginosa* of the same authors (*Ann. Sc. Nat.* sér. 5, ii. 137), whose solitary flowers well agree, and whose fleshy fruit is crowned with the calyx, its seed albuminous, the cotyledons of fleshy embryo plano-convex, and short radicle slightly prominent, really of this genus? *Eugenia ovigera* Br. et Gr. (*Ann. Sc. Nat.* sér. 5, iii. 216), appears from its fruit to be congeneric with this. Which is assigned to its proper genus (*Schizomyrtus*)?

II. LEPTOSPERMEÆ.

20. **Leptospermum** Forst.—Flowers hermaphrodite or more rarely polygamous; receptacle depressed obconical or turbinate, at base covering germen adnate within. Sepals 5, marginally inserted, imbricate, often at last not contiguous. Petals 5, alternate, imbricate, finally patent. Stamens ∞, when adult apparently 1-seriate, shorter than or subequal to petals; filaments unequal, dilated at base; anthers small introrse, versatile; cells parallel, longitudinally rimose. Germen adnate to receptacle within, inferior or partly free, plane or convex at vertex, radiately sulcate and glandular or impressed; cells 3–5, or more rarely 6–12 (sometimes effete); style central, short or elongate, capitate or peltate at stigmatose apex. Ovules in cells ∞ (sometimes few), inserted on 2-lamellate short or more or less prominent sometimes vertically 2-seriate, sometimes transverse or more or less obliquely peltate placenta, horizontal or descending, sometimes recurved. Capsule girt with adnate receptacle, enclosed or exserted above, loculicidal. Seeds in cells 1–∞ (mostly sterile), either linear, or cuneate-angular, in some cases naked, in others ciliate or alate at margins or angles; coat thin; cotyledons of straight exalbuminous embryo longer than radicle.—Small trees or oftener shrubs glabrous or incanescent, odorous; leaves alternate exstipulate small rigid pellucid-punctate, 1–3-nerved or veinless; flowers axillary or terminal, solitary or 2–3-nate, sessile or shortly pedicellate; bracts rather broad, imbricate, falling before anthesis; bracteoles smaller, sometimes longer persistent. (*Trop. Oceania, Australia, New Zealand.*)—See p. 314.

21? **Agonis** DC.[1]—Flowers nearly of *Leptospermum*, stamens 10, 2-seriate or ∞. Germen, etc., of *Leptospermum*; ovules in cells 2–4, inserted on ascending more or less dilated placenta and suberect; micropyle inferior.—Shrubs or small trees; leaves alternate, oftener narrow; flowers capitate; capitules axillary and terminal globose, densely glomeruliferous; each flower 2-bracteolate.[2] (*West. Australia.*[3])

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[1] *Prodr.* iii. 226 (sect. of *Leptospermi*).—B. H. *Gen.* 703.—*Billiottia* R. Br. *Journ. Geogr. Soc.* i. 19.

[2] Query if a sect. of *Leptospermum*? In the genus remain, according to Benth. 2 sections (*Taxandria*, with 10 stamens; *Ataxandria*, with 20–30 stamens).

[3] Spec. about 10. DC. *Mém. Myrtac.* t. 12 (*Leptospermum*).—Labill. *Pl. N.-Holl.* ii. 10, t. 148 (*Leptospermum*).—Bertol. *Amœn.* 29 (*Leptospermum*).—G. Don, *Gen. Syst.* ii. 827 (*Billiottia*).—Lodd, *Bot. Cab.* t. 1219 (*Fabricia*).—Benth. *Fl. Austral.* iii. 96.—Walp. *Rep.* ii. 166, 922; v. 739: *Ann.* ii. 617.

22. **Bæckea** L.[1]—Flowers nearly of *Leptospermum*; sepals 5, persistent. Stamens 5–10, or ∞; filaments either filiform or scarcely complanate (*Euryomyrtus*[2]), or all or 5 petaloidly dilated (*Rinzia*[3]), sometimes at base partly connate (*Hypocalymna*[4]); anthers various in form. Germen 2, 3-locular; ovules 1, 2, superposed, or 3 (*Scholtzia*[5]), or 2–4, or ∞, either collateral, inserted on vertical more or less prominent and 2-lamellate placenta, or disposed in a ring around peltate more or less stipitate placenta. Fruit, etc., of *Leptospermum*; cotyledons of exalbuminous embryo small; slender collum inflexed to thick radicle.—Ericoid glabrous shrubs; leaves opposite; flowers[6] axillary, cymose or spuriously umbellate or capitate, rarely solitary, bracteate and bracteolate.[7] (*Australia, New Caledonia, Indian Archip. south-east. Asia.*[8]

23? **Astartea** DC.[9]—Flowers of *Bæckea*; stamens ∞, 5-adelphous; groups alternipetalous.—Ericoid shrubs; leaves, small opposite glabrous, and other characters of *Bæckea*; flowers[10] axillary solitary or cymose few; pedicels 2-bracteolate.[11] (*West. and trop. Australia.*[12])

24. **Balaustion** Hook.[13]—Flowers rather large; receptacle very concave suburceolate; disk lining receptacle and produced beyond in a thin entire submembranous ring interior to base of stamens and

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[1] L. *Gen.* n. 491.—J. *Gen.* 321.—Lamk. *Dict.* vii. 689; *Ill.* t. 285.—DC. *Prodr.* iii. 229.—Spach, *Suit. à Buffon*, iv. 146.—Endl. *Gen.* n. 6311.—H. Bn. *Payer Fam. Nat.* 366.—B. H. *Gen.* 701, n. 13 (incl.: *Babingtonia* Lindl. *Jungia* Gærtn. *Harmogia* Schau. *Hypocalymna* Endl. *Scholtzia* Schau.).—Hook. *Fl. Ind.* ii. 463.

[2] Schau. *Linnæa*, xvii. 239 (part).

[3] Schau. *loc. cit.*

[4] Endl. *Hueg. Enum.* 30.—B. H. *Gen.* 702, n. 15.

[5] Schau. *Linnæa*, xvii. 241.—B. H. *Gen.* 700, n. 12.—*Piptandra* Turcz. *Bull. Mosc.* (1862), ii. 323 (not Oliv.).

[6] Small, white or pale pink.

[7] Sect. 8 (ex B. H. 6): 1. *Rinzia*, 2. *Euryomyrtus*, 3. *Jungia* (Gærtn. *Fruct.* i. 175, t. 35—*Mollia* Gmel. *Syst.* 420—*Imbricaria* Sm.—*Schidiomyrtus* Schau.), 4. *Harmogia* (Schau. *Linnæa*, xxvii. 238—*Camphoromyrtus* Schau.), 5. *Oxymyrrhine* (Schau. *Linnæa*, xxvii. 240), 6. *Babingtonia* (Lindl. *Bot. Reg.* [1842], t. 10—*Tetrapora* Schau.—*Ericomyrtus* Turcz.) (add.: 7. *Scholtzia*, 8. *Hypocalymna*).

[8] Spec. about 70. Rudge, *Trans. Linn. Soc.* viii. t. 12–14.—Labill. *Sert. Austro-caled.* t. 61, 62 (*Leptospermum*).—Rudg. *Trans. Linn. Soc.* viii. 298, t. 18 (*Schidiomyrtus*).—Andr. *Bot. Repos.* t. 598.—Miq. *Fl. Ind.-Bat.* i. p. i. 405.—Br. et Gb. *Ann. Sc. Nat.* sér. 5, ii. 140.—Benth. *Fl. Hongk.* 118; *Fl. Austral.* iii. 66 (*Scholtzia*), 71, 91 (*Hypocalymna*).—Walp. *Rep.* ii. 169, 920; v. 734; *Ann.* ii. 617. (To this genus is doubtfully referred (B. H. *Gen.* 6) *Aphanomyrtus* (Miq. *Fl. Ind.-Bat.* i. p. i. 480;—Walp. *Ann.* iv. 853).

[9] *Prodr.* iii. 210; *Dict. Cl. d'Hist. Nat.* xi. 400.—Endl. *Gen.* n. 6289.—B. H. *Gen.* 702, n. 11.

[10] Small, white or pink.

[11] A genus differing from *Schidiomyrtus*, a sect. of *Bæckea*, only in its stamens being more or less connate in 5 groups. (B. H.)

[12] Spec. 3. Labill. *Pl. N.-Holl.* t. 170 (*Melaleuca*).—Endl. *Hueg. Enum.* 51 (*Bæckea*).—Spreng. *Syst.* ii. 492 (*Leptospermum*).—Schau. *Pl. Preiss.* i. 113–115.—F. Muell. *Fragm.* i. 83; ii. 32.—Benth. *Fl. Austral.* iii. 89.—Walp. *Rep.* ii. 160, 922; v. 738.

[13] *Icon.* t. 852.—B. H. *Gen.* 702, n. 16.—*Cheynia* J. Drumm. *Hook. Kew Journ.* vii. 56.

free. Sepals 5, rather broad, imbricate, persistent, with as many alternate imbricate finally patent petals inserted at mouth of receptacle. Stamens ∞ (of *Bæckea*), inserted with perianth. Germen inferior, adnate to bottom of receptacle, plane or depressed at apex; style simple, at stigmatose apex capitate, shortly 3-lobed. Ovules in cells 3–∞, inserted around peltate placenta. Fruit inferior capsular, loculicidal at vertex; seeds . . . ?—A low glabrous shrub;[1] leaves opposite ericoid linear; flowers[2] axillary solitary pedunculate; bracteoles 2, membranous, inserted under flower at top of slender peduncle. (*Western Australia.*[3])

25. **Melaleuca** L.[4]—Flowers hermaphrodite or polygamous; receptacle campanulate or urceolate. Sepals 5, free or connate at base, more or less scarous, imbricate, sometimes circumscissile at base deciduous (*Asteromyrtus*[5]). Petals 5, alternate. Stamens ∞, in 5 groups, oppositipetalous, free or at base, sometimes higher, connate in tube (*Lamarchea*[6]); filaments of each group to a greater or less height connate with each other or subfree (*Callistemon*[7]); anthers versatile, 2-rimose. Germen inferior or in part superior; cells 3–5, ∞-ovulate or very rarely (*Conothamnus*[8]), 1-ovulate; placentæ very variable in form, either vertical, 2-lamellate, or peltate, transverse or oblique, more rarely subbasilar. Capsule more or less enclosed by persistent woody receptacle, loculicidal at vertex; seeds perfect linear or cuneate; embryo straight.—Odorous trees or shrubs; leaves alternate or rarely opposite, rigid, either rather broad, 3–∞-nerved, or linear rigid, enervate or obscurely penninerved; flowers[9] sessile in the axils of the floral leaves or bracts solitary and in spikes or capitules not terminal, the branch extending beyond.[10] (*Australia, New Caledonia, Indian Archip.*[11])

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[1] Habit of *Bæckea*.

[2] Rather large (somewhat resembling those of *Punica Granatum*); petals coccineus.

[3] Spec. 1. *B. pulcherrimum* Hook.—Benth. *Fl. Austral.* iii. 95.—*Cheynia pulchra* J. Drumm. —Walp. *Ann.* iv. 822.

[4] *Mantiss.* 14.—J. *Gen.* 323.—Lamk. *Dict.* iv. 16; Suppl. iii. 617; *Ill.* t. 641.—Gærtn. *Fruct.* i. 173, t. 35 (part).—DC. *Prodr.* iii. 211.—Spach, *Suit. à Buffon*, iv. 117.—Endl. *Gen.* n. 6298.—H. Bn. *Payer Fam. Nat.* 367.—B. H. *Gen.* 705, n. 22.—Hook. *Fl. Ind.* ii. 464.—*Gymnagathis* Schau. *Linnæa*, xvii. 243.—*Cajuputi* Adans. *Fam. des Pl.* ii. 84.

[5] Schau. *Linnæa*, xvii. 242.

[6] Gaudich. *Freycin. Voy. Bot.* 483, t. 110.—Endl. *Gen.* n. 6293.—B. H. *Gen.* 704, n. 21.

[7] R. Br. *App. Flind. Voy.* ii. 547; *Bot. Reg.* t. 393.—DC. *Prodr.* iii. 223.—Endl. *Gen.* n. 6302. —B. H. *Gen.* 704, n. 20. (In 1 species, *C. specioso* DC. the staminal filaments long united are in 5 groups, as in most legitimate *Melaleucæ*. This species is *M. paludosa* R. Br. *Ait. Hort. Kew.* ed. 2, iv. 410.)

[8] Lindl. *Swan Riv. App.* 9.—Endl. *Gen.* n. 6297.—B. H. *Gen.* 705, n. 23.

[9] White, pale yellow, pink, lilac, or purple, often showy.

[10] Sect. 3: 1. *Eumelaleuca* (*Melaleuca* Auctt.), 2. *Conothamnus*, 3. *Lamarchea*, 4. *Callistemon*.

[11] Spec. about 120. Cav. *Icon.* t. 332 (*Metrosideros*), 334–336.—Vent. *Jard. Cels.* t. 10, 69 (*Metrosideros*); *Malmais.* t. 4, 47, 76, 112.—Bonpl. *Pl. Malmais.* t. 4, 41, 34 (*Metrosideros*).

26. **Beaufortia** R. Br.[1]—Flowers nearly of *Melaleuca*, 5-merous; groups of stamens oppositipetalous. Anthers basifixed (not versatile); cells transversely 2-valvate at vertex (*Eubeaufortia*[2]) or dorsally opposite, extrorsely rimose or subporous at apex (*Regelia*[3]), more rarely connate at back and dehiscing extrorsely and transversely. Germen, etc., of *Melaleuca*; ovules in cells 3–5, or 2–4, inserted on subpeltate ascending placenta (*Phymatocarpus*[4]), or 4, inserted in pairs on peltate or subpeltate placenta (*Regelia*), oftener 3–5, of which 2 or 4 are abortive; the fertile fifth ascending; micropyle extrorsely inferior (*Eubeaufortia*[5]).—Rigid shrubs;[6] leaves alternate or opposite; flowers sessile, capitate or spicate terminal, or, the branch projecting, not terminal.[7] (*West. Australia.*[8])

27. **Calothamnus** Labill.[9]—Flowers nearly of *Melaleuca* (or *Beaufortia*), 4–5-merous; stamens in 4, 5, groups, oppositipetalous, highly connate; filaments inferior sometimes anantherous; anthers basifixed erect, oblong or linear; cells parallel introverted, longitudinally rimose. Germen, etc., of *Melaleuca*, 3–4-locular; ovules ∞; erect or ascending, inserted on subglobose or more or less peltate placenta. Capsule and seeds of *Melaleuca*.—Glabrous or pilose shrubs; leaves alternate narrow rigid, plane or terete; inflorescence[10] of *Melaleuca*; fruit more or less immersed in enlarged rachis.[11] (*West. Australia.*)

8.—Labill. *Pl. N.-Holl.* t. 165–169, 171–173.—Sweet, *Fl. Austral.* t. 10, 29 (*Metrosideros*).—Field et Gardn. *Sert.* t. 74.—Reichb. *Ic. Exot.* t. 31, 82, 112, 113.—F. Muell. *Fragm.* ii. t. 15.—Benth. *Fl. Austral.* iii. 118 (*Callistemon*), 123 (*Lamarchea*, *Melaleuca*), 163 (*Conothamnus*).—*Bog. Reg.* t. 393 (1838), t. 7 (*Callistemon*), t. 103, 410, 477.—*Bot. Mag.* t. 260, 1761, 1821, 2602 (*Callistemon*), 1860, 1935, 2268, 3210.—Walp. *Rep.* ii. 161 (*Lamarchea*), 162, 165 (*Callistemon*); v. 745, 748 (*Conothamnus*); *Ann.* ii. 618 (*Callistemon*), 621, 622; iv. 824, 825 (*Callistemon*).

[1] *Ait. Hort. Kew*, ed. 2, iv. 418.—Endl. *Gen.* n. 6295.—Schau. *Nov. Act. Nat. Cur.* xxi. p. i. t. 1 A.—Spach, *Suit. à Buffon*, iv. 114.—B. H. *Gen.* 705, n. 24.—*Schizopleura* Lindl. *Swan Riv. App.* ix.—Endl. *Gen.* n. 6296.—*Manglesia* Lindl. *loc. cit.* t. 3 A.

[2] *Beaufortia* of authors.

[3] Schau. *Nov. Act. Nat. Cur.* xxi. 11.—B. H. *Gen.* 706, n. 25.

[4] F. Muell. *Fragm.* iii. 120.—B. H. *Gen.* 706, n. 26.

[5] See, On the *Ovules* of Beaufortia, H. Bn. *Adansonia* iii. 265.

[6] Habit of *Ericaceæ*.

[7] Sect. 3: 1. *Eubeaufortia*, 2. *Regelia*, 3. *Phymatocarpus*.

[8] Spec. 16. Reichb. *Ic. Exot.* t. 102 (*Melaleuca*).—Benth. *Fl. Austral.* iii. 164, 170 (*Regelia*), 171 (*Phymatocarpus*).—Turcz. *Bull. Mosc.* (1847), i. 168 (*Regelia*).—*Bot. Reg.* t. 18.—*Bot. Mag.* t. 1733, 3272.—Walp. *Rep.* ii. 161; v. 748 (*Regelia*), 749; *Ann.* ii. 622.

[9] *Pl. N.-Holl.* ii. 25, t. 164.—DC. *Prodr.* iii. 211.—Spach, *Suit. à Buffon*, iv. 115.—Endl. *Gen.* n. 6294.—Schau. *Nov. Act. Nat. Cur.* xxi. 25, t. 1.—B. H. *Gen.* 706, n. 27.—*Billottia* Colla, *Hort. Rip.* 20, t. 23.

[10] Flowers showy, often polygamous; stamens a beautiful red.

[11] Spec. 22. R. Br. *Ait. Hort. Kew*, ii. 417.—Lindl. *Swan Riv. App.* 9.—F. Muell. *Fragm.* iii. 111.—Benth. *Fl. Austral.* iii. 172.—*Bot. Reg.* t. 1099.—*Bot. Mag.* t. 1506.—Walp. *Rep.* ii. 161, 930; v. 749; *Ann.* ii. 622.

28 ? **Eremæa** Lindl.[1]—Flowers nearly of *Calothamnus* (or *Melaleuca*); stamens in 5 groups, oppositipetalous, most sometimes free; anthers erect basifixed; cells dorsally apposite, extrorsely rimose. Germen 3-locular; ovules in cells few or ∞, inserted in 2-lobed placenta more or less longitudinally vertical or subbasilar and ascending.—Shrubs generally ericoid; leaves alternate, 1–5-nerved or enervate; flowers terminal, solitary or few (2, 3), bracts imbricate involucrate. Other characters of *Melaleuca* or *Kunzea.*[2] (*West. Australia.*[3])

29 ? **Kunzea** Reichb.[4]—Flowers nearly of *Eremœa*; receptacle rather long, lined with disk. Stamens ∞, free; anthers versatile (of *Callistemon*). Ovules in cells ∞, 2–∞-seriate recurved. Capsule, enclosed in receptacle, loculicidal, and other characters of *Melaleuca.*—Shrubs generally ericoid; leaves alternate small rigid entire; flowers in axils of upper leaves solitary or oftener in terminal capitules (sometimes, from extension of branch, not terminal.[5] (*Extra trop. Australia.*[6])

30. **Tristania** R. Br.[7]—Flowers hermaphrodite; receptacle subplane or concave, hemispherical or turbinate campanulate, glandular or more or less pilose within. Sepals 5, subvalvate or imbricate. Petals 5, alternate, membranous or more or less coriaceous, imbricate. Stamens ∞, shortly or oftener (*Eutristania*[8]) long 5-adelphous; groups oppositipetalous; filaments free above, either erect (*Neriophyllum*[9]), or more or less inflexed (*Eutristania, Lophostemon*[10]); anthers short, versatile. Germen inferior (*Lophostemon, Neriophyllum*), or more or less superior, for the greater part free (*Eutristania*),

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[1] *Swan Riv. App.* 11.—Endl. *Gen.* n. 6304. B. H. *Gen.* 707, n. 30.

[2] A genus of very doubtful autonomy, "it differs from *Calothamnus* in habit short stamens and anthers, from *Phymatocarpus* in anthers, from both in inflorescence" (B. H.), characters here apparently of less importance.

[3] Spec. 5. Schau. *Pl. Preiss.* i. 156.—Endl. *Hueg. Enum.* 50 (*Metrosideros*).—F. Muell. *Fragm.* ii. 29.—Benth. *Fl. Austral.* iii. 180.—Walp. *Rep.* ii. 166.

[4] *Consp.* 175.—B. H. *Gen.* 703, n. 19.—*Salisia* Lindl. *Swan Riv. App.* 10.—Endl. *Gen.* n. 6308.—*Pentagonaster* Kl. *Ott. et Dietr. Allg. Gartenz.* iv. 113.

[5] A genus scarcely to be retained, being very near *Callistemon*, a section of *Melaleuca*, and differing from *Eremœa* only in its anthers.

[6] Spec. about 15. Vent. *Malmais.* t. 46 (*Metrosideros*).—Sm. *Exot. Bot.* t. 59 (*Leptospermum*).—? Labill. *Pl. N.-Holl.* ii. 9, t. 147 (*Leptospermum*).—Reichb. *Hort. Bot.* i. t. 84 (*Callistemon*).—Schau. *Pl. Preiss.* i. 123.—F. Muell. *Fragm.* ii. 27.—Benth. *Fl. Austral.* iii. 111.—Walp. *Rep.* v. 741; *Ann.* ii. 619.

[7] *Ait. Hort. Kew*, ed. 2, iv. 417.—DC. *Prodr.* iii. 210.—Spach, *Suit. à Buffon*, iv. 113.—Endl. *Gen.* n. 6290.—H. Bn. *Payer Fam. Nat.* 366.—B. H. *Gen.* 708, n. 32.—Hook. *Fl. Ind.* ii. 465.

[8] B. H. *loc. cit.* 709, sect. 3.—*Tristaniopsis* Br. et Gr. *Ann. Sc. Nat.* sér. 5, ii. 130.

[9] B. H. *loc. cit.* sect. 1.

[10] Schott, *Wien. Zeitschr.* iii. (1830) 772.—B. H. *loc. cit.* sect. 3.

3-locular; style simple, at apex truncate or more or less dilated stigmatose. Ovules in cells ∞, inserted on a vertical or thick squamiform or peltate (*Eutristania*) entire or more or less 2-lobed placenta, horizontal or descending, straight recurved or reflexed. Capsule free or more or less adnate to receptacular tube, loculicidal above; valves septate within, ∞-spermous. Seeds cuneate or attenuate above or alato-dilated; cotyledons of straight exalbuminous embryo plano-convex, longer than ascending radicle.—Trees or shrubs glabrous or with various integument; leaves alternate or subverticillate, more rarely (*Neriophyllum*) opposite, oftener coriaceous; flowers[1] in axillary or terminal more or less ramose, sometimes corymbiform cymes, bracteate. (*Australia*, *New Caledonia*, *Indian Archip.*[2])

31. **Metrosideros** Banks.[3]—Flowers hermaphrodite; receptacle concave, of various form; sometimes subplane. Sepals 5, slightly imbricate or valvate, more or less connate, sometimes unequally lacerate or calyptrately solute (*Pleurocalyptus*[4]). Petals 5, alternate, imbricate. Stamens ∞, longer than petals, free or subfree; anthers short, versatile. Germen inferior, semi-superior or superior; cells 3, complete or incomplete. Ovules ∞, sometimes few (*Tepualia*[5]). or 1 (*Sarcynpia*[6]) transverse or ascending or descending, inserted in a vertical or capitate, clavate or peltate (*Xanthostemon*[7]), transverse or oblique, entire or more or less 2-lobed placenta. Fruit capsular, or more or less adnate to receptacle loculicidal or sometimes irregularly dehiscent above. Seeds ∞, oftener ascending, imbricate, linear or occasionally cuneate, more rarely semi-orbiculate; cotyledons of exalbuminous embryo plane, plano-convex or plicate, longer than radicle.—Trees or shrubs, sometimes scandent, glabrous or tomentose; leaves opposite or alternate, rarely subverticillate, penninerved; flowers[8] cymose; cymes axillary or terminal more or less compound,

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[1] White, orange or yellowish.

[2] Spec. about 20. Bonpl. *Malmais.* t. 30.—Benn. *Pl. Jav. Rar.* 127, t. 27.—Miq. *Fl. Ind.-Bat.* i. p. i. 397.—Benth. *Fl. Austral.* iii. 261.—Br. et Gr. *Ann. Sc. Nat.* sér. 5, ii. 130; iii. 228; xiii. 383; *Nouv. Arch. Mus.* iv. 12, t. 5 (*Tristaniopsis*).—*Bot. Reg.* t. 1839.—*Bot. Mag.* t. 1058 (*Melaleuca*).—Walp. *Rep.* ii. 160, 927: v. 744; *Ann.* ii. 621.

[3] *Gærtn. Fruct.* i. 170, t. 34 (part).—Lamk. *Ill.* t. 421.—Poir. *Dict.* Suppl. iii. 679.—DC. *Prodr.* iii. 224.—Spach, *Suit. à Buffon*, iv. 138.—Endl. *Gen.* n. 6303 (part).—H. B. *Payer Fam. Nat.* 366.—B. H. *Gen.* 710, n. 38,—E. Tison, *Bull. Soc. Lin. Par.* 102.—*Nania* Miq. *Fl. Ind.-Bat.* i. p. i. 399; *Journ. Bot. Néerl.* (1861) 297.

[4] Br. et Gr. *Nouv. Arch. Mus.* iv. 20, t. 8, *Ann. Sc. Nat.* sér. 5, xiii. 387.

[5] Griseb. *Pfl. Philipp.* 31; *Abh. K. Wiss. Gœtt.* vi.—B. H. *Gen.* 710, n. 36.

[6] The type of which is *Syncarpia laurifolia.*

[7] F. Muell. *Hook. Kew Journ.* ix. 17.—B. H. *Gen.* 711, n. 39.—Benth. *Hook. Icon.* t. 1040.—? *Draparnaudia* Montrouz. *Mém. Acad. Lyon.* x. 205 (ex B. H.).—*Fremya* Br. et Gr. *Bull. Soc. Bot. Fr.* x. 374; *Ann. Sc. Nat.* sér. 5, ii. 131; iii. 227; *Nouv. Arch. Mus.* iv. 17, t. 7.

[8] Oftener showy, orange, golden or red, generally articulate.

more or less stipitate, sometimes collected in spurious capitules (*Syncarpia*[1]).[2] (*Oceania from Indian Archipelago to New Zealand,*[3] *South Africa, Chili.*[4])

32? **Mooria** Montrouz.[5]—Flowers nearly of *Metrosideros*, 5-merous; sepals slightly imbricate. Petals 5, scarcely longer, imbricate. Stamens ∞, generally subequal to petals free; anthers versatile. Germen partly sometimes almost entirely free, 3-locular. Ovules in cells ∞, oftener few, inserted on placenta obliquely ascending from internal angle, ascending. Capsule more or less adnate to receptacle, loculicidal. Seeds sometimes attenuate or alate; cotyledons of exalbuminous embryo longer than radicle, oblong.—Shrubs or small trees, more frequently much branched; leaves opposite penninerved, glabrous or tomentose; flowers[6] solitary or oftener more or less compoundly cymose, terminal or axillary at apex; other characters of *Metrosideros.*[7] (*New Caledonia.*[8])

33? **Arillastrum** Panch.[9]—Flowers nearly of *Metrosideros* (or *Tristania*), 4-merous; receptacle concave subcampanulate. Sepals decussately imbricate. Petals imbricate, finally patent, subcoriaceous, externally ferruginous puberulous. Stamens ∞, in 4 oppositipetalous groups; the exterior sterile; anthers of fertile ones oblong introrse. Germen inferior, internally adnate to receptacle, 2-locular; placentæ rather prominent, 2-lobed, ∞-ovulate. Fruit capsular, adnate within to thick woody subcampanulate receptacle, crowned with 4 thick or broad cuneate teeth (sepals), opening loculicidally at apex and finally incompletely 2-valvate. Seeds ∞, of which 1 generally mature subspherical in each cell; cotyledons of exalbuminous subspherical embryo broad reflexed replicate; coat loaded and involved with remaining sterile membranous squamose ovules.[1]—A remarkable tree, yielding a gummy juice; trunk large; leaves opposite penninerved punctulate; indumentum ferruginous; flowers[2] glomerate in upper axils at top of peduncle dilated and compressed at apex, 3-nate, bracteolate.[3] (*New Caledonia.*[4])

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[1] Ten. *Mem. Soc. Ital. Moden.* xxii. t. 1.—Endl. *Gen.* n. 6291.—B. H. *Gen.* 709, n. 33.—*Kamptzia* Nees, *Nov. Act. Nat. Cur.* xviii. Suppl. præf. 8, t. 1.

[2] Sect. 4: 1. *Tepualia*, 2. *Nania*, 3. *Xanthostemon*, 4. *Kamptzia*, 5. *Syncarpia*, 6. *Sarcynpia* (to which perhaps may be added *Lysicarpus* F. Muell. *Trans. Phil. Inst. Vict.* ii. 68.—Benth. *Fl. Austral.* iii. 266; *Gen.* 709, n. 34; *Hook. Ic.* t. 1042, differing in exterior anthers being sterile reniform.

[3] Labill. *Sert. Austro-caled.* t. 59, 60.—Hook. and Arn. *Beech. Voy. Bot.* t. 12.—Hook. *Icon.* t. 569.—Gaudich. *Freyc. Voy. Bot.* t. 108, 109.—F. Muell. *Fragm.* i. 243.—Miq. *Fl. Ind.-Bat.* i. p. i. 401.—A. Gray, *Unit. St. Expl. Exp. Bot.* i. t. 68–70.—Hook. f. *Fl. N.-Zeal.* t. 15–17; *Handb. N.-Zeal. Fl.* 70.—Br. et Gr. *Ann. Sc. Nat.* sér. 5, ii. 137.—Benth. *Fl. Austral.* iii. 265 (*Syncarpia*), 267, 268 (*Xanthostemon*).—*Bot. Mag.* t. 4515, 4471, 4488.—*Rev. Hort.* (1865) 310 (*Fremya*).—Walp. *Rep.* ii. 165; v. 741; *Ann.* ii. 619; iv. 823 (*Tepualia, Nania*), 824 (*Syncarpia*), 826.

[4] Spec. 1. C. Gay, *Fl. Chil.* ii. 378 (*Myrtus*).—Hook. f. *Fl. Antarct.* ii. 75.

[5] *Mém. Acad. Lyon.* x. 204.—? *Ballardia* Montrouz. *loc. cit.* 204 (ex B. H.).—*Cloezia* Br. et Gr. *Bull. Soc. Bot. Fr.* x. 576; *Ann. Sc. Nat.* sér. 5, ii. 134; *Nouv. Arch. Mus.* iv. 16, t. 6.—B. H. *Gen.* 709. n. 35.

[6] Moderate or small.

[7] Of which perhaps only a section, a mean between the true *Metrosideros* and *Tepualia* (?), distinct only by its short stamens and petals.

[8] Spec. about 8, polymorphous, Seem. *Journ. Bot.* ii. 74 (*Bæckea*).

[9] Ex Br. et Gr. *Bull. Soc. Bot. Fr.* x. 574.—*Spermolepis* Br. et Gr. *loc. cit.*; *Ann. Sc. Nat.* sér. 5, ii. 136 (part); xiii. 374; *Nouv. Arch. Mus.* iv. 22, t. 9.—B. H. *Gen.* 710, n. 37.

34. **Eucalyptus** Lher.[5]—Flowers oftener 4-merous; receptacle very concave, campanulate or turbinate. Calyx continuous with margin, oftener short, truncate, entire at apex or remotely 4-dentate. Petals inserted with calyx and highly connate in herbaceous or coriaceous hood circumscissile and deciduous at anthesis or rarely (*Eudesmia*[6]) more or less evidently solute. Stamens ∞, ∞-seriate; filaments free, incurved or spirally twisted in bud; anthers small, versatile; cells parallel, longitudinally rimose. Germen inferior, adnate within to bottom of receptacle, flat at vertex, 2–4-locular; style short or more or less elongate filiform, scarcely or not at all dilated at stigmatose apex. Ovules in cells ∞, often horizontal, sometimes partly sterile. Fruit capsular, internally adnate to indurate and at mouth truncate receptacle, loculicidal at vertex. Seeds ∞, often 2-morphous,[7] angular or linear-cuneate; cotyledons of straight exalbuminous embryo plane or complicate, longer than radicle.—Aromatic trees, sometimes lofty, often glaucous; leaves opposite or alternate,[8] entire penninerved coriaceous pellucid-punctate; flowers[9] axillary, in pedunculate, umbelliform or capituliform cymes, 5–∞, sometimes rarely solitary; fruit either free, or more rarely (*Symphyomyrtus*[10]) connate with each other; bracts narrow or membranous and falling long before anthesis. (*Australia, Ind. Archip.*[11])

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[1] Resembling an aril (whence name of genus).

[2] Yellow, showy.

[3] A race very near to some *Tristaniæ* of the same region, differing in the nature of its fruit and seeds.

[4] Spec. 1. *A. gummiferum* Panch. *loc. cit.*; *Not. bois N.-Caléd.* 251.—*Spermolepis gummifera* Br. et Gr. *loc. cit.*

[5] *Sert. Angl.* 18.—Lamk. *Ill.* t. 422.—Poir. *Dict.* Suppl. ii. 590.—DC. *Prodr.* iii. 216.—Spach, *Suit. à Buffon*, iv. 126.—Endl. *Gen.* n. 6300.—Payer, *Organog.* 459, t. 98.—H. Bn. *Payer Fam. Nat.* 366.—B. H. *Gen.* 707, n. 30.

[6] R. Br. *App. Flind. Voy.* ii. 599, t. 3.—DC. *Prodr.* iii. 216.—Endl. *Gen.* n. 6299.

[7] The inferior (like the ovules) ovoid or subglobose short; but the superior often linear-elongate and (always ?) sterile.

[8] Often in the same tree; the inferior opposite, the superior alternate.

[9] White or pale golden, sometimes purplish, often rich in odorous nectar.

[10] Schau. *Pl. Preiss.* i. 126.

[11] Spec. about 150. Gærtn. *Fruct.* i. t. 34, fig. 1·(*Metrosideros*),—Cav. *Icon.* t. 340-342.—Sm. *Pl. N.-Holl.* t. 13, 42, 43; *Exot. Bot.* t. 84.—Labill. *Voy.* t. 13, 20; *Pl. N.-Holl.* t. 150–154. DC. *Mém. Myrtac.* t. 4–11.—Bonpl. *Malm.* t. 13. —Sweet, *Fl. Austral.* t. 24 (*Eudesmia*).—Link et Otto, *Abbild.* t. 45.—Coll. *Hort. Rip. App.* 4, t. 1.—Miq. *Fl. Ind.-Bat.* i. p. i. 398.—Hook. *Icon.* t. 405, 611, 619, 849, 879.—F. Muell.

35. **Angophora** Cav.[1]—Flowers nearly of *Eucalyptus*; calyx gamophyllous, 5-costate, membranous at margin, remotely 5-dentate; teeth rather prominent. Petals 5, distinct, connivent in a globe, highly imbricate, deciduous at base. Stamens gynæcium and capsule of *Eucalyptus*; seeds[2] in cells 1, ovate plano-compressed, peltately affixed; cotyledons of straight exalbuminous embryo orbicular-cordate, plane or at margin alternately replicate; radicle very short straight.—Trees or shrubs; leaves, generally opposite, coriaceous, and other characters of *Eucalyptus*;[3] flowers in terminal compound-ramose corymbiform cymes. (*East. Australia.*[4])

36. **Backhousia** Hook. & Harv.[5]—Flowers oftener 4-merous; receptacle deeply cupular or obconical, adnate at base to germen within. Sepals 4, often subpetaloid, persistent. Stamens ∞; filaments free, slender, ∞-seriate; anthers versatile. Germen free to a variable extent, 2-locular; style slender simple, scarcely dilated at stigmatose apex; ovules ∞, inserted on longitudinal or subapical placenta, transverse or descending, nearly straight or recurved. Fruit capsular, more or less free, girt with persistent perianth, 2-coccous, indehiscent (?); seeds cuneate or obovate; cotyledons of straight embryo straight or (where known) conduplicate; radicle shorter. Small trees or shrubs; leaves opposite; flowers[6] in axillary compound umbelliform or capituliform cymes; bracts very caducous. (*East. Australia.*[7])

37. **Osbornia** F. Muell.[8]—Flowers generally 8-merous, apetalous; receptacle concave turbinate, not produced beyond germen adnate within. Sepals 8, sub-2-seriate, persistent. Stamens ∞, few-seriate;

Journ. Linn. Soc. iii. 81; *Pl. Vict.* Suppl. t. 16, 17; *Fragm.* ii. 32, 171; iii. 57, 130, 152; iv. 51, 159; v. 14, 45; vi. 25; vii, 41; viii. 142, 184.—Benth. *Fl. Austral.* iii. 185.—*Bot. Reg.* t. 947.—*Bot. Mag.* t. 2087, 3260, 4036, 4266, 4333, 4637, 6151.—Walp. *Rep.* ii. 163, 924; v. 743; *Ann.* ii. 619; iv. 824.—Th. Irnusch, *Ein Beob. an* Eucalyptus Globulus, *Zeitschr. f. d. ges. Naturwiss.* bd. xlvii. (1876); and on the uses of this species: *Chemical Products of the Eucalyptus, J. of All. Sci.* ed. Simmonds, vii. 148 (Oct. 1876).

[1] *Icon.* iv. 21, t. 338, 339.—DC. *Prodr.* iii. 222.—Spach, *Suit. à Buffon*, iv. 134.—Endl. *Gen.* n. 6301.—B. H. *Gen.* 707, n. 29.

[2] Where known.

[3] From which genus it differs only by its solute petals and form of seeds (? if constant) (B. H.).

[4] Spec. 4. Gærtn. *Fruct.* i. 171, t. 34, fig. 2 (*Metrosideros*).—Pers. *Enchir.* ii. 25 (*Metrosideros*).—Sm. *Trans. Linn. Soc.* iii. 267; *Exot. Bot.* t. 42 (*Metrosideros*).—Andr. *Bot. Repos.* t. 281 (*Metrosideros*).—Vent. *Malmais.* t. 5 (*Metrosideros*).—Lodd. *Bot. Cab.* t. 106 (*Metrosideros*).—Link. *En. Hort. Berol.* ii. 31 (*Eucalyptus*).—F. Muell. *Fragm.* i. 31; iv. 170.—Benth. *Fl. Austral.* iii. 183.—*Bot. Mag.* t. 1960 (*Metrosideros*).—Walp. *Rep.* ii. 164, 920; *Ann.* iv. 825.

[5] *Bot. Mag.* t. 4133.—B. H. *Gen.* 711, n. 40.

[6] White or pale greenish.

[7] Spec. 4. F. Muell. *Fragm.* i. 78; ii. 26. 171.—Benth. *Fl. Austral.* iii. 269.

[8] *Fragm. Phyt. Austral.* iii. 30.—B. H. *Gen.* 711, n. 41.

anthers small, versatile, 2-rimose. Germen inferior, 2-locular, style simple, at stigmatose apex rather obtuse. Ovules in subcomplete or incomplete cells ∞, 2-seriate. Fruit dry (?) indehiscent, crowned with calyx; seeds 1, 2, obovoid; coats thin; cotyledons of straight embryo plano-convex and longer than radicle.—A glabrous shrub;[1] leaves opposite obovate-oblong penninerved coriaceous;[2] flowers axillary or terminal, solitary or glomerate, 3-nate, hoary tomentose; bracteoles caducous.[3] (*Trop. Australia.*[4])

III. CHAMÆLAUCIEÆ.

38. **Chamælaucium** Desf.—Flowers hermaphrodite or sometimes polygamous; receptacle concave, obconical or campanulate, sometimes 5–10-costate. Sepals 5, marginally inserted, short, imbricate, finally patent, sometimes ciliate or subpetaloid. Petals 5, alternate, longer, orbicular, concave, imbricate. Stamens 10, inserted 2-seriately with perianth and alternating with as many elongate incurved glandular squamules ("staminodes"); filaments short thick incurved, free or very shortly connate at base; anthers short or subglobose extrorse; cells adnate to thick connective, dehiscing by a short longitudinal fissure. Germen inferior, adnate to receptacle within, 1-locular; style erect, oftener shorter than the perianth, often stigmatose and variously dilated under apex, barbate with rigid glandular simple hairs. Ovules in cell 6–10, sometimes 2-seriate, inserted on subbasilar or oblique eccentric placenta, ascending, anatropous; micropyle extrorsely inferior. Fruit crowned with persistent calyx, dry, ndehiscent; seeds ascending 1, 2; embryo . . . ?—Ericoid pellucid-punctate odorous shrubs; leaves opposite or rarely alternate, linear entire; flowers axillary to leaves or to bracts inserted at top of twigs, essile or shortly stipitate, solitary or few cymose; inflorescence terminal sometimes capituliform; bracts widely scarious enclosing the bud and falling before or at anthesis. (*South-west. Australia*).—See p. 321.

39. **Darwinia** Rudge.[5]—Flowers nearly of *Chamælaucium*, 5-

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[1] Except flowers.

[2] Nearly of *Lumnitzera*.

[3] Gen. connecting the *Myrtaceæ* with the *hizophoraceæ* and *Combretaceæ*.

[4] Spec. 1. *O. octodonta* F. Muell.—Benth. *ook. Ic.* n. 1041; *Fl. Austral.* iii. 271.

[5] *Trans. Linn. Soc.* xi. 299, t. 22 (not Dennst.).—Don, *Edinb. New Phil. Journ.* (Apr. 1829), 84.—Schau. *Myrt. Xeroc.* t. 2 D.—Endl. *Gen.* n. 6282.—B. H. *Gen.* 697, n. 2.—H. Bn. *Adansonia*, xi. 3 (incl.: *Genetyllis* DC. *Schuermannia* F. Muell.

merous; sepals 5, broad petaloid (*Schuermannia*[1]), entire or ciliate, sometimes minute squamiform (*Genetyllis*[2]) or subnil. Stamens 10, 2-seriate,[3] alternating with an equal number of glands;[4] anthers subglobose, dehiscing subdorsally by pores or very short fissures. Germen inferior, 1-locular; style generally elongate subulate, under apex imbarbate or oftener barbate. Ovules in cells 2, or rarely 4, occasionally[5] inserted on parietal placenta, ascending, anatropous; micropyle extrorsely inferior. Fruit crowned with perianth, indehiscent. Seed 1; embryo fleshy (undivided?[6]).—Odorous shrubs; leaves alternate or rarely opposite, entire or ciliate, pellucid-punctate, articulate; flowers in axils of upper leaves solitary or terminal capitate (*Genetyllis*[7]) and there often involucrate with leaf-like (coloured) bracts; bracteoles lateral. (*Australia.*[8])

40? **Actinodium** SCHAU.[9]—Flowers[10] of *Darwinia*, 4-merous; receptacle 4-gonal; glands between stamens 0.—An ericoid shrub; leaves alternate linear; capitules terminal, involucrate with membranous coloured bracts; bracteoles scarious. Other characters of *Darwinia.*[11] (*Trop. Australia.*[12])

41? **Homoranthus** A. CUNN.[13]—Flowers nearly of *Darwinia*, 5-merous; receptacle tubular, 5-costate; sepals long subulate and petals long superior. Stamens, alternate glandules and germen of *Darwinia*; ovules 4–8, inserted on short basilar eccentric placenta. Fruit . . .?—An ericoid shrub; leaves opposite, linear-3-quetrous; flowers at summit of twigs 2–4, solitary in axils of bracts; bracteoles broadly scarious enclosing buds and falling before anthesis.[14] (*East. Australia.*[15])

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[1] F. MUELL. *Linnæa*, xxv. 386.

[2] DC. *Prodr.* iii. 209; *Dict. Class.* xi. 400; *Mém. Myrtac.* t. 2.—ENDL. *Gen.* n. 6284.—*Hedaroma* LINDL. *Sw. Riv. App.* 7, t. 2 B.—ENDL. *Gen.* n. 6285.—*Polyzone* ENDL. *Ann. Wien. Mus.* ii. 490; *N. St. Mus. Vindob. Dec.* 80; *Gen.* n. 6283.—*Cryptostemon* F. MUELL. ex MIQ. *Ned. Kruidk. Arch.* iv. 114.—*Francisia* ENDL. *Gen.* n. 6286.

[3] The adult appear to be 1-seriate.

[4] Staminodes according to some authors.

[5] Oppositipetalous.

[6] Macropod very thick; but the radicles very small; plumule incumbent (?).

[7] Sect. 2 (B. H.): 1. *Genetyllis*, 2. *Schuermannia.*

[8] Spec. 22, 23. TURCZ. *Bull. Mosc.* (1847) i. 155; (1849), ii. 18 (*Genetyllis*).—ENDL. *Hueg. Enum.* 47 (*Genetyllis*).—MEISSN. *Journ. Linn. Soc.* i. 36 (*Genetyllis*).—KIPP. *Journ. Linn. Soc.* i. 49 (*Genetyllis*).—F. MUELL. *Fragm.* ii. 169 (*Genetyllis*); iv. 58, 174 (*Genetyllis*); viii. 182.—BENTH. *Fl. Austral.* iii. 6.—*Bot. Mag.* t. 4858, 4860, 5468 (*Genetyllis*).—WALP. *Rep.* ii. 153, 920; v. 727; *Ann.* ii. 615 (*Genetyllis*); v. 821 (*Schuermannia*).

[9] *Linnæa*, x. 311; *Myrt. Xeroc.* 24, t. 1 B.—B. H. *Gen.* 696, n. 1.

[10] The exterior sterile.

[11] Of which it is rather a section?

[12] Spec. 1. *A. Cunninghamii* SCHAU. *Lindl. Introd.* ed. 2, 440; *Pl. Preiss.* i. 96.—BENTH. *Fl. Austral.* iii. 5.—*A. proliferum* TURCZ. *Bull. Mosc.* (1849) ii. 17.—*Triphelia brunioides* R. BR.—ENDL. *Hueg. Enum.* 48.

[13] Ex SCHAU. *Linnæa*, x. 310; *Myrt. Xeroc.* 39, t. 13.—ENDL. *Gen.* n. 6281.—B. H. *Gen.* 697, n. 3.—*Euosanthes* A. CUNN. (ex ENDL.).

[14] A genus differing from *Darwinia* (of which it is rather a section?) only in sepals.

[15] Spec. 1. *H. virgatus* A. CUNN.—BENTH. *Fl. Austral.* iii. 16.

42. **Verticordia** DC.[1]—Flowers nearly of *Chamælaucium*, receptacle externally 5–10-costate. Sepals[2] 5, patent, deeply divided into bristly plumose or pectinate-ciliate lobes (sometimes in addition 5 exterior alternate, herbaceous or deeply ciliate scarious and reflexed). Petals 5, entire, or fimbriate. Stamens 10, alternating with as many glandules; anthers short, poricid or shortly rimose. Germen 1-locular; ovules 1, 2 or more rarely 3–10, inserted on basilar or eccentric placenta, erect or ascending, anatropous or peritropous; micropyle extrorsely inferior. Fruit crowned with calyx, indehiscent (?). Seed 1; embryo fleshy (undivided ?[3]).—Shrubs; leaves opposite or very rarely alternate, often ericoid, etc., of *Chamælaucium*; flowers in upper axils solitary or in spikes, racemes or terminal corymbs; bracteoles 2, subscarious, imbricate and enclosing the bud, falling long before anthesis. Other characters of *Chamælaucium*.[5] (*Australia.*[6])

43. **Pileanthus** Labill.[7]—Flowers nearly of *Chamælaucium*, sepals 10, petaloid, subequal, entire, patent. Stamens 20 and upwards, one interior to each sepal; the rest 4–∞ interior to each petal; filaments dilated or 2-furcate at apex; anther-cells longitudinally rimose, contiguous or very remote in furcate filaments. Germen, etc., of *Chamælaucium*; ovules 6–10, inserted on eccentric basilar placenta, 2-seriate.—Ericoid shrubs; leaves oftener opposite linear, 3-quetrous or terete; flowers terminal corymbose; upper leaves 1-florous; bracteoles broad scarious enclosing bud, falling early circumscissus above the base. (*South-west. Australia.*[8])

44 ? **Lhotzkya** Schau.[9]—Flowers 5-merous; receptacle lageniform

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[1] *Dict. Class.* xi. 400; xvi. 565; *Prodr.* iii. 209.—Spach, *Suit. à Buffon*, iv. 110.—Endl. *Gen.* n. 6279.—H. Bn. *Payer Fam. Nat.* 368.—B. H. *Gen.* 697, n. 4.—*Chrysorrhoe* Lindl. *Comp. to Bot. Mag.* ii. 357; *Sw. Riv. App.* t. 1; *Hook. Journ. Bot.* ii. t. 13.—*Diplachne* R. Br. mss. ex Schau.

[2] Generally coloured.

[3] Radicle very macropod; gemmule (?) very small incumbent (?), undivided or 2-lobed.

[4] Petals white pink or sometimes yellow.

[5] Sect. (ex Schau. *Myrt. Xeroc.* t. 4 B) in 2 gen.: 1. *Calymmatanthus*; appendages of calyx comose; 2. *Euvcrticordia*; appendages 0.

[6] Spec. about 39. Desf. *Mém. Mus.* v. t. 4, 19 (*Chamælaucium*).—Lindl. *loc. cit.* t. 2 A.—Schau. *Lehm. Pl. Preiss.* i. 99.—Hook. *Journ. Bot.* ii. t. 13 (*Chrysorrhoe*), 14.—Turcz. *Bull. Mosc.* (1849) ii. 19.—F. Muell. *Trans. Vict. Inst.* 122; *Fragm.* i. 164, 226; iv. 58; v. 14; viii. 182.—Benth. *Fl. Austral.* iii. 16.—*Bot. Mag.* t. 5286.—Walp. *Rep.* ii. 154; v. 730; *Ann.* ii. 616.

[7] *Pl. N.-Holl.* ii. 11, t. 149.—DC. *Prodr.* iii. 209.—Spach, *Suit. à Buffon*, iv. 111.—Endl. *Ann. Wien. Mus.* ii. 196; *Gen.* n. 6278.—Schau. *Myrt. Xeroc.* 77, t. 5, fig. A, B.—B. H. *Gen.* 698, n. 5.

[8] Spec. 3. J. *Ann. Mus.* xix. 432.—Desf. *Mém. Mus.* v. t. 3.—F. Muell. *Fragm.* i. 225.—Meissn. *Journ. Linn. Soc.* i. 45.—Benth. *Fl. Austral.* iii. 34.—Walp. *Rep.* ii. 157; v. 731.

[9] *Linnæa*, x. 309; *Lindl. Introd.* ed. 2, 493; *Myrt. Xcroc.* t. 7.—Endl. *Gen.* n. 6276.—B. H. *Gen.* 609, n. 8.

dilated below and there enclosing germen adnate within, higher produced to a long tubular neck and at apex dilated to a cupule bearing at the margin the perianth and the stamens. Sepals 5, obtuse or retuse, not aristate. Petals 5. Stamens ∞, ∞-seriate. Germen inferior, 1-locular; ovules 2, ascending, inserted on placenta extending from base to apex of cell. Fruit dry, crowned with calyx, indehiscent; seed 1; cotyledons of straight exalbuminous embryo minute.—Ericoid shrubs; alternate and sometimes opposite leaves, etc., of *Calythrix*.[1] (*Australia*.[2])

45. **Calythrix** Labill.[3]—Flowers (nearly of *Lhotzkya*); receptacle long lageniform; neck sometimes very narrow tubular, above cupularly dilated and bearing perianth inserted on margin. Sepals[4] 5, patent, scarious at margin and mucronate or oftener far produced to a setiform arista. Petals 5, entire, deciduous. Stamens ∞ (often 25–30), ∞-seriate; the interior shorter; filaments inserted with perianth, unequal;[5] anthers short introrse, versatile. Germen inferior, adnate within to receptacle, 1-locular; placenta springing from dissepiform bottom of germen and extending to its apex. Ovules 2, subbasilar, collaterally erect anatropous; micropyle introrsely[7] inferior. Fruit often crowned with calyx and receptacle, dry, indehiscent. Seed 1, erect; cotyledons of thick straight embryo very short.—Ericoid shrubs or undershrubs; leaves alternate, semiterete or 3–4-quetrous, articulate at base and there sometimes furnished with 2 minute linear caducous stipules; flowers[8] axillary or capitately corymbose at summit of twigs; floral leaves often changed to bracts; bracteoles 2, lateral, persistent, subfoliaceous or often scarious, imbricate.[9] (*Australia*.[10])

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[1] From which genus it differs only in its obtuse or retuse sepals and in nearly the same manner as *Homorantho Darwinia*.

[2] Spec. 8. Arn. *Hook. Journ. Bot.* ii. t. 15.—Lindl. *Sw. Riv. App.* 7; *Mitch. Thr. Exped.* ii. 178 (*Genetyllis*).—Turcz. *Bull. Mosc.* (1862) ii. 324.—Schau. *Pl. Preiss.* i. 103.—F. Muell. *Trans. Phil. Soc. Vict.* i. 16; *Fragm.* i. 13, 224.—Benth. *Fl. Austral.* iii. 53.—Walp. *Rep.* ii. 157; v. 732.

[3] *Pl. N.-Holl.* ii. 8, t. 146 (*Calytrix*).—DC. *Prodr.* ii. 208; *Mém. Myrt.* t. 1.—Spach, *Suit. à Buffon*, iv. 107.—Schau. *Myrt. Xeroc.* (ex *Nov. Act. Nat. Cur.* xix.) 288, t. 6 B.—B. H. *Gen.* 699, n. 7.—*Calycothrix* Meissn. *Gen.* 107.—Endl. *Gen.* n. 6275.—H. Bn. *Payer Fam. Nat.* 367.

[4] Petaloid.

[5] The 5 smaller oftener alternipetalous.

[6] Septum sometimes incomplete.

[7] Opposite insertion of septum.

[8] White, pink, or yellow.

[9] A genus differing from *Lhotzkya* only in the form of the sepals.

[10] Spec. about 34. Lindl. *Sw. Riv. App.* 5, t 3 B.—A. Rich. *Voy. Astrol. Bot.* t. 16.—Field et Gardn. *Sert. Pl.* t. 38.—Schau. *Pl. Preiss.* i 104.—Meissn. *Journ. Linn. Soc.* i. 46.—Turcz *Bull. Mosc.* (1847) i. 164; (1849) ii. 20.—A Cunn. *Bot. Mag.* t. 3323.—F. Muell. *Trans. Inst Vict.* iii. 42; *Fragm.* i. 12, 146, 222; iv. 36, 177 vii. 40; viii. 182.—Benth. *Fl. Austral.* iii. 39 —*Bot. Reg.* t. 409.—Walp. *Rep.* ii. 157; v. 733 *Ann.* ii. 616.

46. **Thryptomene** Endl.[1]—Flowers 5-merous; receptacle short, cylindrical, turbinate or hemispherical. Sepals 5, entire, patent, persistent (petaloid). Petals 5, connivent, persistent. Stamens 5–10, alternipetalous;[2] filaments short inflexed; anthers introrse, sometimes crowned with globular apiculate connective; cells distinct, at apex poricid or shortly rimose. Germen inferior, adnate within to receptacle; ovules in cell 2, ascending (of *Calythrix*) or more rarely 4–10, inserted on a more or less elongate dissepimentiform parietal placenta; style slender simple, at apex capitate stigmatose. Fruit dry, 1–2-spermous, indehiscent or spuriously 2-coccous. Seeds globose or hemispherical; radicle of exalbuminous embryo very thick; cotyledons minute inflexed to apex of slender neck.—Ericoid glabrous shrubs;[3] leaves opposite entire, small or minute, thick pellucid-punctate; flowers axillary, solitary or more rarely few cymose; pedicels articulate under flower; bracteoles 2 lateral, partly scarous, deciduous. (*Australia.*[4])

47? **Homalocalyx** F. Muell.[5]—Flowers nearly of *Thryptomene*; 5-merous; perianth caducous. Stamens ∞ (8–20); anthers versatile. Germen inferior; ovules 2, inserted on eccentric subbasilar placenta. Fruit ...? Other characters of *Thryptomene*[6] (or *Lhotzkya*).—Ericoid glabrous shrubs; leaves alternate or rarely opposite, closely packed entire (small); flowers axillary solitary subsessile; bracteoles 2 lateral, broad marginally or entirely scarious, generally persistent. (*Warm Australia.*[7])

48? **Micromyrtus** Benth.[8]—Flowers nearly of *Thryptomene*; sepals 5, persistent (sometimes 0). Petals 5, small, patent, deciduous, more rarely persistent. Stamens 5, oppositipetalous, or 10; anthers small, 2-rimose. Germen 1-locular; ovules 2–4, descending from apex of filiform placenta extending from bottom to top of cell, collateral. Fruit, seed, embryo, etc., of *Thryptomene*.[9]—Ericoid shrubs;

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[1] *Ann. Wien. Mus.* ii. 192; *Nov. Stirp. Mus. Vindob. Dec.* 72; *Gen.* n. 6277.—Schau. *Myrt. Xeroc.* t. 6 A.—B. H. *Gen.* 700, n. 10.—*Paryphantha* Schau. *Linnæa*, xvii. 235. — *Astræa* Schau. *loc. cit.* 238 (not Kl.)—*Eremopyxis* H. Bn. *Adansonia*, ii. 328.

[2] 1 or 2 stamens before each sepal.

[3] Habit of *Bæckea* or *Leptospermum*.

[4] Spec. 17. Schau. *Pl. Preiss.* i. 102.—A. Cunn. *Bot. Mag.* t. 3160 (*Bæckea*).—DC. *Mém. Myrt.* t. 14 (*Bæckea*).—Hook. f. *Hook. Kew Journ.* v. 299, t. 8; *Fl. Tasm.* i. 128.—Turcz. *Bull. Mosc.* (1847) i. 156; (1862) ii. 324.—F. Muell. *Fragm.* i. 11; iv. 63, 169.—Walp. *Rep.* v. 732, *Ann.* i. 306; iv. 822.

[5] *Hook. Kew Journ.* ix. 309.—B. H. *Gen.* 699, n. 9.

[6] Of which perhaps only a section and to which it has been more recently referred (F. Muell. *Fragm.* iv. 63, 77).

[7] Spec. 2. Benth. *Fl. Austral.* iii. 56.

[8] *Gen.* 700, n. 11.

[9] Of which perhaps a section (?).

leaves opposite entire (small); flowers[1] axillary solitary; peduncles short or very short, 2-bracteolate. (*Australia.*[2])

IV. BARRINGTONIA.

49. **Barringtonia**[3] Forst.—Flowers hermaphrodite, 4- or rarely 5-merous; receptacle concave obconical or sacciform, scarcely or not at all produced beyond the germen adnate within. Calyx valvate, finally 2–4-fid (*Butonica*[4]) or imbricate 3–4-lobed (*Stravadium*[5]). Petals 4, 5, epigynously inserted and alternating with sepals, imbricate. Stamens ∞, at base connate with petals in a short ring and falling with them; filaments otherwise free, exserted; anthers small, versatile or rarely subbasifixed, 2-rimose. Disk epigynous surrounding with a short ring the top of the germen and base of style. Germen inferior, 2–4-locular; style simple, often subulate, scarcely or not at all dilated at stigmatose apex. Ovules in cells 2–∞, transverse or descending, 2-seriate, or the inferior descending; micropyle introrsely superior. Fruit fleshy or oftener fibrous, often 4-angular, crowned with persistent calyx, indehiscent. Seed generally by abortion 1, testa oftener thick; embryo exalbuminous fleshy undivided corticate.—Trees or shrubs; leaves alternate, often crowded at top of twigs, entire, crenate or serrate, penninerved impunctate; flowers in racemes or spikes, sometimes broken or very elongate; bracts small caducous; bracteoles 2, very small or 0. (*Trop. regions of old world.*)—See p. 326.

50? **Planchonia** Bl.[6]—Flowers nearly of *Barringtonia*, 4-merous; sepals 4, imbricate. Stamens ∞; anthers small, versatile; the interior longer anantherous. Germen 3–4-locular; cells ∞-ovulate. Berry corticate, crowned with calyx. Seeds few; funicle elongate; cotyledons of involute circinate embryo foliaceous plicate; radicle very long clavate spirally convolute.—Trees; leaves alternate crenate impunctate and other characters of *Barringtonia*;[7] flowers terminal,[8] shortly racemose; bracts and bracteoles not caducous, oblong.[9] (*Indian Archip.*[10])

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[1] Minute, or small, pink.

[2] Spec. 6, 7. Poir. *Dict.* Suppl. v. 247 (*Stereoxylon*).—Sm. *Trans. Linn. Soc.* iii. 259 (*Imbricaria*).—Sieb. *Spreng. Syst. Cur. post.* 149 (*Bæckea*).—F. Muell. *Fragm.* i. 30 (*Bæckea*); iv. 63 (*Thryptomene*).—Benth. *Fl. Austral.* iii. 63.

[3] Miers, '*On Barringtoniaceæ*' (*Trans. Linn. Soc.* ser. 2, i. [1875] 47; *Barringtonia* (*loc. cit.*) 54, 55, t. 10).—*Agasta* Miers (*loc. cit.* 54, 59, t. 11, 12). A genus proposed for *B. splendida*, Soland. *macrophylla* Miq. *speciosa* Wight & Arn.—*Megadendron* Miers (*loc. cit.* 54, 109, t. 15, 16). A genus proposed for *B. macrocarpa* Hassk. and *timorensis* Bl.—*Chydenanthus* Miers. (*loc. cit.* 54, 111). A genus proposed for *B. excelsa* Bl.

[4] Miers (*loc. cit.* 54, 59, t. 13, 14).

[5] Miers (*loc. cit.* 54, 80, t. 17); 54, 107, t. 18.

[6] *V. Houtte Fl. des Serres*, vii. 24.—B. H. *Gen.* 721, n. 63.—Miers (*loc. cit.* 54, 90, t. 18).—Hook. *Fl. Ind.* ii. 511.

[7] Of which rather a section (?).

[8] "Golden greenish or white."

[9] Rather perhaps a section of the preceding?

[10] Spec. 2, 3 (or var. of one?). Miq. *Fl. Ind.-Bat.* i. p. i. 493.—Walp. *Ann.* iv. 852.

51 ? **Careya** Roxb.[1]—Flowers nearly of *Barringtonia*, 5-merous. Stamens ∞ ; the exterior longest and the innermost short sterile anantherous; the intermediate fertile; anthers small, versatile. Germen 4–5-locular; ovules ∞, 2-seriate, etc., of *Barringtonia*.[2] Berry globose corticate, crowned with calyx; seeds ∞, nestling in pulp. Embryo undivided (of *Barringtonia*).—Lofty trees or sometimes subshrubby; leaves alternate collected at top of twigs impunctate; flowers[3] interruptedly spicate or racemose lateral. (*East India, trop. Australia.*[4])

52. **Petersia** Welw.[5]—"Flowers nearly of *Barringtonia*, 4-merous; receptacle ovoid-turbinate, externally herbaceous-4-alate. Sepals 4, alternating with wings, imbricate. Stamens all fertile; anthers sub-2-dymous; cells divaricate. Germen inferior; cells 2, ∞-ovulate. Fruit fibrous oblong,[6] furnished externally with 4 longitudinal membranous semiorbicular veined wings; seeds 1–4; embryo . . . ?—A large tree; leaves alternate, penninerved membranous pellucid-punctate; flowers[7] in short dense racemes solitary in upper axils or gathered in a terminal corymb; bracts and bracteoles few caducous."[8] (*Trop. west. Africa.*[9])

53. **Fœtidia** Commers.[10]—Flowers hermaphrodite apetalous, 3–4-merous, very rarely 5-merous; receptacle turbinate, enclosing adnate germen. Sepals 3–5 marginally inserted, thick coriaceous, valvate or reduplicate-valvate, persistent. Stamens ∞, epigynous very crowded, ∞-seriate; filaments free, unequal;[11] anthers ovate or oblong, versatile; cells parallel, longitudinally rimose. Germen inferior, 2–5-locular; cells equal in number to sepals and alternating with them; style central erect slender, at apex stigmatose shortly 3–5-branched; branches open-recurved. Ovules in cells ∞, inserted on

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[1] *Pl. Coromand.* iii. 13, t. 217, 218; *Fl. Ind.* ii. 638.—DC. *Prodr.* iii. 295 (part).—Endl. *Gen.* n. 6326.—Bl. *V. Houtt. Fl. Serres*, vii. 25.—B. H. *Gen.* 721, n. 62.—*Cambea* Ham. *Mys.* iii. 187 (ex Endl.).—Miers (*loc. cit.* t. 16, 17).—Hook. *Fl. Ind.* ii. 510.—*Doxoma* Miers (*loc. cit.* 54, 99, t. 15). A genus proposed for *Careya pendula* Griff. *Stravadium cochinchinense* Bl. *Barringtonia cylindrostachya* Griff. *B. rosea*, Wall. *B. sarcostachys* Wall. *B. sumatrana* Miq. *B. neocaledonica* Vieill. *Vriesii* Teysm. etc.

[2] Of which rather a section.

[3] Large or small, often showy, white; stamens a beautiful red.

[4] Spec. 2, 3. Wight, *Ill.* ii. t. 99, 100; *Icon.* t. 147, 157.—Wight and Arn. *Prodr.* i. 334.—Thw. *Enum. Pl. Zeyl.* 119.—Miq. *Fl. Ind.-Bat.* i. p. i. 494.—F. Muell. *Fragm.* v. 183 (*Barringtonia*).—Benth. *Fl. Austral.* iii. 289.—Walp. *Rep.* ii. 192.

[5] Ex B. H. *Gen.* 721, n. 61 *a* (not Kl.).

[6] "Or with wings broadly obcordate (2½ in. long, 2 in. broad)."

[7] Rather small.

[8] "A genus allied to *Barringtonia*, differing in punctate leaves, wings of calyx, and fruit and anthers." (B. H.)

[9] Spec. 1. *P. africana* Welw.—Laws. *Oliv. Fl. Trop. Afr.* ii. 439.

[10] Ex J. *Gen.* 325.—Lamk. *Dict.* ii. 457; *Ill.* t. 419.—DC. *Prodr.* iii. 295.—Endl. *Gen.* n. 6328.—H. Bn. *Payer Fam. Nat.* 369.—B. H. *Gen.* 724, n. 73.—Baker, *Fl. Maurit.* 120.

[11] The larger the nearer they are to the middle of the sepals, often inflexed in the bud.

a transverse or oblique capitate parietal placenta, anatropous, sessile or stipitate.[1] Fruit turbinate coriaceous, enlarged at flattened vertex, 1–4-locular; seeds ∞;[2] embryo . . . ?—Glabrous trees;[3] leaves alternate, collected at top of twigs, petiolate, entire, coriaceous penninerved, at vernation convolute; flowers[4] axillary solitary or few cymose pedunculate.[5]—(*Mascarene isles, Malacca.*[6])

54? **Sonneratia** L. f.[7]—Flowers hermaphrodite, 4–8-merous; receptacle subcampanulate, enclosing adnate germen and produced higher bearing at margin 4–8 thick valvate 3-angular sepals. Petals 0, or 4–8, small, linear or long filiform, sometimes spathulate. Stamens ∞, filaments slender, ∞-seriate, incurved in bud, finally reflexed; anthers reniform or hippocrepiform, versatile, 2-rimose. Germen adnate at depressed apex or more or less free, ∞-locular; style slender simple, plicate in bud, at apex stigmatose obtuse or minutely capitate. Ovules in cells ∞, inserted on internal placenta, recurved, often ascending, imbricate. Fruit baccate, coriaceous, increased by persistent calyx, ∞-locular, indehiscent (?); cells ∞-spermous. Seeds more or less nestling in interior pulp, long curved; testa thick very hard; cotyledons of exalbuminous embryo foliaceous convolute; radicle terete elongate.—Glabrous trees and shrubs;[8] leaves opposite petiolate exstipulate, oblong or subelliptical, entire coriaceous thick; nerves scarcely or not at all conspicuous; flowers[9] axillary solitary or terminal 3-nate.[10] (*All trop. shores of old world.*[11])

55? **Grias** L.[12]—"Flowers 4–5-merous; receptacle turbinate not produced beyond germen adnate to cavity within. Calyx inserted on margin cyathiform, at first subentire, finally divided, irregularly 2–4-lobed. Petals 4, or more rarely 5, patent. Stamens ∞, inserted on thick subcupular disk; filaments unequal, ∞-seriate; the interior smaller; all thick connivent in a globe involute; anthers small; cells distinct rimose. Germen inferior, 4-locular; style short, at apex cross-rayed-4-lobed; ovules in cells 2–4, descending. Fruit fleshy, crowned with calyx; seed oftener 1, descending; testa thick; embryo . . . ?—Lofty trees; leaves alternate, collected at top of twigs, entire or sinuate penninerved epunctate; flowers cymose on trunk or branches, shortly pedicellate.[1]" (*Trop. America.*[2])

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[1] Chalaza facing inwards.

[2] "Arillate."

[3] With a bitter tenacious bark.

[4] White oftener rather large.

[5] An anomalous genus of *Lythrariæ* (B. H.)

[6] Boj. *Hort. Maur.* 141.—Bl. *Mus. Lugd-Bat.* i. 143.—Walp. *Ann.* ii. 193.

[7] *Suppl.* 38.—J. *Gen.* 325.—Lamk. *Dict.* i. 429; *Ill.* t. 420.—Buchan. *Sym. Ava*, iii. 313, t. 25.—DC. *Prodr.* iii. 231.—Endl. *Gen.* n. 6342.—H. Bn. *Payer Fam. Nat.* 365.—B. H. *Gen.* 784, n. 26.—Baker, *Fl. Maurit.* 102.—*Aubletia* Gærtn. *Fruct.* i. 379, t. 78 (not Jacq. nor Lour. nor Rich. nor Schreb.).—*Chiratia* Montrouz. *Mém. Acad. Lyon.* x. 202.—Br. et Gr. *Bull. Soc. Bot. Fr.* xi. 69; *Ann. Sc. Nat.* sér. 5, i. 362; vi. 266.—H. Bn. *Adansonia*, vii. 255 (where before the authorities previously cited, it is shown that *Chiratia* differs in no respect from *Sonneratia*, that stipules are wanting, and that least of all is it *Legnotideæ*).—*Tombea* Br. et Gr. *loc. cit.*

[8] Habit of some *Rhizophoreæ.*

[9] Large, white or pink.

[10] A genus of *Lythrarieæ.* (B. H.)

[11] Spec. 3, 4. Sonner. *Voy.* 16, t. 10, 11 (*Papagate*).—Rumph. *Herb. Amboin.* iii. t. 73, 74 (*Mangium*).—Rheed. *Hort. Mal.* iii. 43, t. 40 (*Blatti*).—Wight and Arn. *Prodr.* i. 327.—Wight, *Ic.* t. 340.—Miq. *Fl. Ind.-Bat.* i. p. i. 485; Suppl. 316.—Bl. *Mus. Lugd.-Bat.* i. 336.—Benth. *Fl. Austral.* iii. 301.—Walp. *Rep.* ii. 170; *Ann.* iv. 691, 830.

[12] *Gen.* n. 659.—J. *Gen.* 257.—Lamk. *Dict.* iii. 45.—Sw. *Obs.* 215.—Sm. *Rees Cyclop.* 15.—DC. *Prodr.* iii. 296.—Endl. *Gen.* n. 6335.—B. H. *Gen.* 722, n. 65.—Miers, *Trans. Linn. Soc.* xxx. 171, 298, t. 36 c.

56. **Gustavia** L.[3]—Flowers 4–6-merous; receptacle turbinate or subhemispherical. Sepals 4–6, connate at base or higher, persistent. Petals 5–8, subequal, imbricate. Stamens ∞, regularly ∞-seriate; filaments equally urceolately connate at base, inflexed in bud; anthers basifixed linear, sub-4-locellate; cells parallel, dehiscing by longitudinal or sometimes short poriform cleft. Germen inferior, adnate within to receptacle, at apex flat or depressed, 4–6-locular; style central very short, apex stigmatose very shortly lobate or sulcate. Ovules in cells ∞, anatropous; funicle short or 0. Fruit fibrous, crowned with calyx or umbilicate at apex, indehiscent. Seeds ∞ (oftener few), suspended by means of an elongate incrassate plicate arilliform funicle; testa hard; cotyledons of exalbuminous embryo thick, sometimes unequal; radicle short.—Trees or shrubs; leaves alternate,[4] entire or serrate penninerved, oftener impunctate; flowers solitary or few cymose; peduncle articulate, sometimes 2-bracteolate to middle. (*Trop. America.*[6])

57 ? **Cariniana** Casar.[7]—Flowers nearly of *Gustavia*, 5–6-merous. Stamens ∞, unequal, ∞-seriate; filaments connate at base to a more

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[1] A genus apparently allied in some respects to *Gustavia*, in others to *Couratari*, but not seen by us.

[2] Spec. 1, 2 (ex Miers 4). Sloan. *Hist.* ii. 123, t. 127, fig. 1, 2 (*Anchovy Pear*).—P. Br. *Jam.* 245.—Lun. *Hort. Jam.* i. 19.—Seem. *Voy. Herald, Bot.* 126.—Griseb. *Fl. Br. W.-Ind.* 242.—Hook. f. *Bot. Mag.* t. 5622.—Walp. *Rep.* ii. 193.

[3] *Amœn.* viii. 266, t. 5.—L. f. *Suppl.* 51.—Poit. *Ann. Mus.* xiii. 156, t. 5–7.—DC. *Prodr.* iii. 289.—Spach, *Suit. à Buffon*, iv. 187.—Endl. *Gen.* n. 6327.—Berg, *Linnæa*, xxvii. 441.—B. H. *Gen.* 721, n. 64.—*Pirigara* Aubl. *Guian.* i. 487, t. 192, 193.—J. *Gen.* 326.—Poir. *Dict.* v. 344.—Lamk. *Ill.* t. 592.—H. B. K. *Nov. Gen. et Spec.* vii. 261.—*Spallanzania* Neck. *Elem.* 79, n. 733.—*Teichmeyera* Scop. *Introd.* n. 1212.

[4] Nearly of *Dilleniæ*.

[5] White or pink or red, showy.

[6] Spec. about 10. Berg, *Mart. Fl. Bras. Myrt.* 469, t. 55, 56.—Miers, *Trans. Linn. Soc.* xxx. 158, 175, t. 33 A.—Hook. *Bot. Mag.* t. 5069, 5239, 6151.—Walp. *Rep.* ii. 193; v. 756.

[7] *Nov. Stirp. Bras. Dec.* 35.—Miers, *Trans. Linn. Soc.* xxx. 169, 284, t. 35 C.

or less elongate cupule adnate within to bottom of corolla, above free and there incurved or occasionally produced to a short ligule; anthers of all fertile, more or less incurved in the bud. Germen inferior, 3–5-locular; ovules in cells ∞, ascending. Fruit oblong cylindrical, dehiscing by an apical often hemispherical circumscissile operculum. Seeds few, inserted round a central column on incrassate subbasilar sporophores, long-winged below. Embryo exalbuminous contortuplicate; radicle very large cylindrical arcuately ascending; cotyledons broadly foliaceous contortuplicate incumbent.—Trees; leaves alternate, oftener serrate; flowers in terminal ramose racemes; bracts and bracteoles small, caducous.[1]—(*Trop. America.*[2])

58. **Couratari** Aubl.[3]—Flowers of *Cariniana*, oftener 6-merous; ligule of andrœcium elongate, loaded externally at apex with crowded stamens sterile (?) but here and there provided with small (well defined) anthers. Fruit, etc., of *Cariniana;* operculum nearly equal to pericarp. Seeds circumalate; embryo exalbuminous contortuplicate. —Lofty trees; leaves alternate entire; inflorescence, etc., of *Cariniana.*[4] (*Trop. America.*[5])

59. **Couroupita** Aubl.[6]—Flowers nearly of *Couratari*, 6-merous; ligule of andrœcium elongate large incurved fleshy subpetaloid cucullate. Stamens nearly all either subbasilar, or fertile at top of ligule; anthers of all basifixed erect, longitudinally 2-rimose. Germen large partly superior, 5–8-locular; style short thick; cells ∞-ovulate. Fruit subglobose coriaceous-woody, indehiscent, ring-marked with scar of marginal receptacle, umbilicate at apex. Seeds ∞, imbedded in pulp, exalate; embryo, etc., of *Couratari.*—Trees; leaves alternate,

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[1] Perhaps better a sect. of *Courataris*, differing only in the ligule being shorter, the stamens all fertile and the fruit only sometimes alate.

[2] Spec. 7 (ex Miers). Raddi, *Mem. Soc. Ital. Moden. Phys.* xviii. 403.—Mart. *Flora*, xx. 127 (*Courataris*).—Berg, *Mart. Fl. Bras. Myrt.* 510, t. 78–82 (*Courataris*).

[3] *Guian.* ii. 723, t. 290.—A Rich. *Ann. Sc. Nat.* sér. 1, i. 321, t. 21.—Poit. *Mém. Mus.* xiii. 159, t. 8.—DC. *Prodr.* iii. 294.—Spach, *Suit. à Buffon*, iv. 198.—Endl. *Gen.* n. 6331.—H. Bn. *Payer Fam. Nat.* 370.—B. H. *Gen.* 722, n. 66 (part).—Miers, *Trans. Linn. Soc.* xxx. 168, 279, t. 35 B, 62.—*Lecythopsis* Schr. *Denkschr. Acad. Münch.* vii. 241.—Berg, *Mart. Fl. Bras. Myrt.* 503, t. 7, 75, 76.—B. H. *Gen.* 723, n. 68.

[4] Is *Cercophora* Miers (*Trans. Linn. Soc.* xxx. 172, 301, t. 36 B), of which one Amazonian species is described (*C. anomala* Miers) as having a 6-merous flower, unknown to us, a nerved helmet-shaped ligula, produced at apex to an incurved subulate lamina, allied to this?

[5] Spec. about 7 (ex Miers). Velloz. *Fl. Flum.* v. t. 86 (*Lecythis*).—Cambess. *A. S.-H. Fl. Bras. Mer.* ii. 274, t. 159.

[6] *Guian.* 708, t. 282.—Poit. *Mém. Mus.* xiii. 152, t. 78.—DC. *Prodr.* iii. 293.—Turp. *Dict. Sc. Nat.* Atl. t. 227–229.—Spach, *Suit. à Buffon*, iv. 196.—Endl. *Gen.* n. 6334.—H. Bn. *Payer Fam. Nat.* 370.—B. H. *Gen.* 722, n. 67.—Miers, *Trans. Linn. Soc.* xxx. 139, 188, t. 33 B.—*Pontoppidana* Scop. *Introd.* n. 849. —*Elscholtzia* Rich. (not W.).

entire or serrate; stipules minute, caducous; flowers[1] in large racemes springing from the trunk and branches; bracts and bracteoles caducous. (*Trop. America.*[2])

60. **Lecythis** Loefl [3]—Flowers nearly of *Couratari*, 3–6-merous; ligule of andrœcium large petaloid, at apex once or twice (sometimes contrarywise) cucullate. Andrœcium of *Couratari* (or *Couroupita*); stamens interior at top of ligule sterile, anantherous or with small effete anthers, sometimes (*Allantoma*[4]) aggregated in a mass. Germen inferior or partly superior, 2–6-locular; style short and other characters of *Couroupita*. Fruit clothed with externally adnate calyx, globose or cupuliform, sometimes subcylindrical, coriaceous or woody; operculum on both sides conical or convex, more rarely (*Eschweilera*[5]) concave within. Seeds few, stipate on a thick fleshy arilliform funicle, sometimes narrow elongate very rugose (*Allantoma*), externally glabrous or variously reticulate costate; embryo undivided fleshy.—Trees, sometimes immense; leaves alternate, entire or serrate; inflorescence,[6] etc., of *Couroupita*. (*Trop. America, Africa,*[7] *trop. and east. islands.*[8])

61. **Bertholletia** H. B.[9]—Flowers nearly of *Lecythis*; calyx gamophyllous, at first closed; lobes very short to apex; finally unequally 2–4-fid, deciduous. Petals unequal or subequal. Stamens at top of cucullate ligule sterile. Germen inferior; cells 4, 5, pauciovulate. Fruit broadly subglobose woody, to a large extent externally stipate to adnate receptacle and girt with its margin, dehiscing by a small circumscissile operculum. Seeds ∞ (oftener about 20), obovoidly 3-quetrous; testa very hard rugose; embryo fleshy undi-

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[1] Large, "dirty white or pink."

[2] Spec. 6, 7. Berg, *Linnæa*, xxvii. 461; xxxi. 261; *Mart. Fl. Bars. Myrt.* 475, t. 57–59.—*Bot. Mag.* t. 3158.

[3] *It.* 189.—L. *Gen.* n. 664.—J. *Gen.* 327.—Lamk. *Ill.* t. 476.—Poir. *Dict.* vi. 25.—DC. *Prodr.* iii. 290.—Spach, *Suit. à Buffon*, iv. 185.—Endl. *Gen.* n. 6332.—Poit. *Mém. Mus.* xiii. 141, t. 2, 3, 7.—H. Bn. *Payer Fam. Nat.* 369.—B. H. *Gen.* 723, n. 69.—Miers, *Trans. Linn. Soc.* xxx. 162, 199, t. 34 A, 38–57.—*Chytroma* Miers, *loc. cit.* 164, 229, t. 34 B.—? *Jugastrum* Miers, *loc. cit.* 167, 275, t. 35 A (stamens at top of ligule sometimes fertile ?).

[4] Miers, *loc. cit.* 170, 291, t. 36 A.

[5] Mart. *DC. Prodr.* iii. 293.—Miers, *loc. cit.* 165, 246, t. 34 C.

[6] Flowers often showy.

[7] Query if natives of this country ?

[8] Spec. about 50 (ex Miers 130). Jacq. *Amer.* t. 109.—Aubl. *Guian.* t. 283–289.—A. S.-H. *Fl. Bras. Mer.* ii. 272.—Berg, *Linnæa*, xxvii. 448; xxix. 258; *Mart. Fl. Bras. Myrt.* 479, t. 62–74.—Walp. *Rep.* ii. 193.

[9] *Pl. Æquin.* i. 122, t. 36.—Poit. *Mém. Mus.* xiii. 148, t. 4–8.—DC. *Prodr.* iii. 293.—Endl. *Gen.* n. 6333.—Schomb. *Proc. Bot. Soc.* i. 71, t. 3, 4.—H. Bn. *Payer Fam. Nat.* 670.—B. H. *Gen.* 723, n. 70.—Miers, *Trans. Linn. Soc.* xxx. 161, 195, t. 33 C, 37.

vided.—A lofty tree; leaves alternate impunctate; flowers[1] in terminal ramose glomeruliferous racemes; bracteoles subfoliaceous oblong-cuneate, caducous. (*Trop. America.*[2])

V. NAPOLEONEÆ.

62. **Napoleona** Pal. Beauv.—Flowers hermaphrodite regular; receptacle turbinate, enclosing germen adnate within. Sepals 5, marginally inserted, 3-angular, valvate. Petals 5, alternate, inserted with calyx, connate in orbicular shortly 5-lobed corolla; lobes longitudinally multiplicate, valvate, denticulate at apex. Disk interior to corolla duplex petaloid, consisting of 2 concentric crowns; the exterior composed of laciniæ subulate-ligulate subfree or connate only at base; the interior connate in multilobed tube inflexed at apex; both connate with base of corolla and andrœcium and falling with them. Stamens oftener 20 ("more rarely 25-∞"), in 5 alternipetalous groups; the stamens of each group generally 4, of which the 2 exterior are fertile, the interior anantherous; the filaments of all petaloid ligulate incurved; anthers of the exterior adnate introrse, 1-locular, 1-rimose. Germen inferior, 5-locular; cells oppositipetalous; style erect short thick, 5-gonal, at apex dilated-peltate, 5-angular, stigmatose along 5 furrows. Ovules in cells ∞, generally few (4), 2-seriate, finally descending, with micropyle introrsely superior, or slightly ascending, with micropyle extrorsely inferior. Fruit baccate corticate, crowned with calyx; seeds few imbedded in pulp; cotyledons of reniform embryo plano-convex fleshy; radicle short retracted to hilum of cotyledons.—Glabrous trees; leaves alternate, entire or obscurely sinuate, penninerved, epunctate; flowers axillary, solitary or few glomerulate; bracts under flower few, decussate-imbricate, larger from the lower to the higher, often on both sides (as the sepals and sometimes the leaves) bearing an elliptic gland sessile to margin. (*Trop. west. Africa.*)—See p. 331.

63. **Asteranthos** Desf.—Flowers nearly of *Napoleona*; receptacle shorter. Calyx gamophyllous membranous, sinuate denticulate at margin. Corolla widely rotate, ∞-plicate, destitute of crown within. Stamens ∞, connate with corolla at base, ∞-seriate; filaments fili-

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[1] Yellow; strong-scented.

[2] According to earliest authors 1 species, much noted, viz., *B. excelsa* (concerning which see p. 350, note 2), according to Miers 2.—Mart. *Reis.* iii. 1130; *Mat. Med. Bras.* 17.—Berg, *Linnæa*, xxvii. 460; *Mart. Fl. Bras. Myrt.* 478, t. 60, 61.

form; anthers basifixed, 2-locular, introrsely 2-rimose to margins. Germen semi-inferior; style elongate, apex capitate shortly lobed. Ovules in cells ∞, elongate, anatropous, descending. Fruit . . . ?—A tree; branches slender; leaves alternate entire penninerved epunctate and other characters of *Napoleona*; flowers axillary solitary shortly stipitate; bracteoles 2, caducous. (*North Brazil*, *Guiana.*)—See p. 333.

VI. PUNICEÆ.

64. **Punica** T.—Flowers hermaphrodite; receptacle obconical or turbinate, enclosing germen adnate within and produced higher and widened fleshy (coloured). Sepals 5–7, continuous with margin of receptacle, thick, valvate, persistent. Petals 5–7, inserted in hollows of sepals, obovate-lanceolate, imbricate corrugate, early deciduous. Stamens ∞, inserted within on receptacle, ∞-seriate; filaments slender incurved; anthers small introrse, 2-rimose, versatile. Germen inferior, ∞-locular; style flexuose, dilated at conical base, apex capitate stigmatose. Cells 2-seriately superposed; placenta of (often 5) upper alternipetalous parietal; of lower (often 3–5) axile. Ovules in each placenta ∞, anatropous, ∞-seriate. Fruit corticate thickly coriaceous, crowned with calyx; cells ∞, irregularly superposed; septa unequal membranous. Seeds ∞, unequally compressed; exterior coat pulpy; interior woody; cotyledons of exalbuminous embryo broadly foliaceous, auriculate at base, spirally convolute; radicle short subcentral.—A branched shrub, often spinescent; leaves opposite, alternate or subfasciculate, obovate-oblong obtuse entire; flowers axillary, solitary or few cymose; pedicels short or 0. (*North Africa* (?), *Levant* (?).)—See p. 333.

LV. HYPERICACEÆ.

In this small family, which derives its name from that of St. John's Wort (*Hypericum*) (fig. 339, 344–353), and which formerly included only the plants attributed to that genus, *H. guianense* and *cayense*, with the analogous species forming the genus *Vismia*[1] (fig. 340–343), present the most complete types for our first study. In these the flowers are regular, hermaphrodite, nearly always pentamerous. Their convex receptacle bears at first five sepals, thick, but abruptly thinned at the margin, along which they are quincuncially imbricate (fig. 342). With them alternate five petals, twisted or more rarely imbricate in prefloration, internally covered with hairs, sometimes much developed. The stamens are very numerous, but collected in five oppositipetalous bundles consisting of one large tongue from which are detached at different heights above, slender filaments, each surmounted by a small bilocular anther, introrse at first, but early

Vismia guianensis.

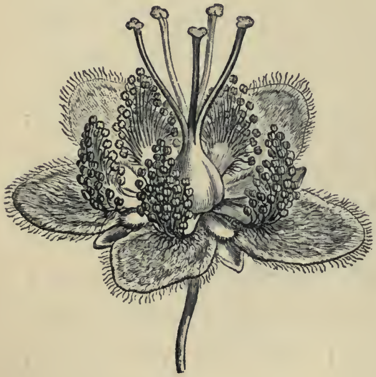

Fig. 341. Flower ($\frac{1}{4}$).

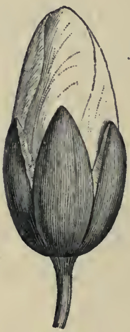

Fig. 340. Bud.

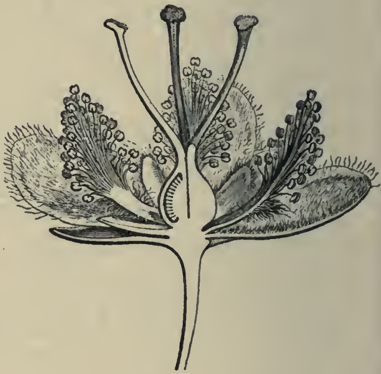

Fig. 343. Long. sect. of flower.

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[1] Velloz. ex Vandell. *Ræm. Scr.* 138, t. 7, fig. 4.—Chois. *Prodr. Monogr. Hypéric.* Genève (1821), 3, t. 1, 2.—DC. *Prodr.* i. 542.—Spach, *Consp. Monogr. Hyperic. Ann. Sc. Nat.* sér. 2, v. 349 *Suit. à Buffon,* v. 348.—Endl. *Gen.* n. 5466.—Payer, *Fam. Nat.* 79.—B. H. *Gen.* 166, 980, n. 6. —*Coapia* Pis. *Bras.* 126. — Scop. *Introd.* n. 1256.—*Acrossanthue* Presl. *Bot. Bem.* 22 (ex Pl. *Ann. Sc. Nat.* sér. 4, ii. 264).

reflexed, dehiscing by two longitudinal clefts.[1] In the intervals between the staminal bundles, and consequently of the petals, are

Hypericum perforatum.

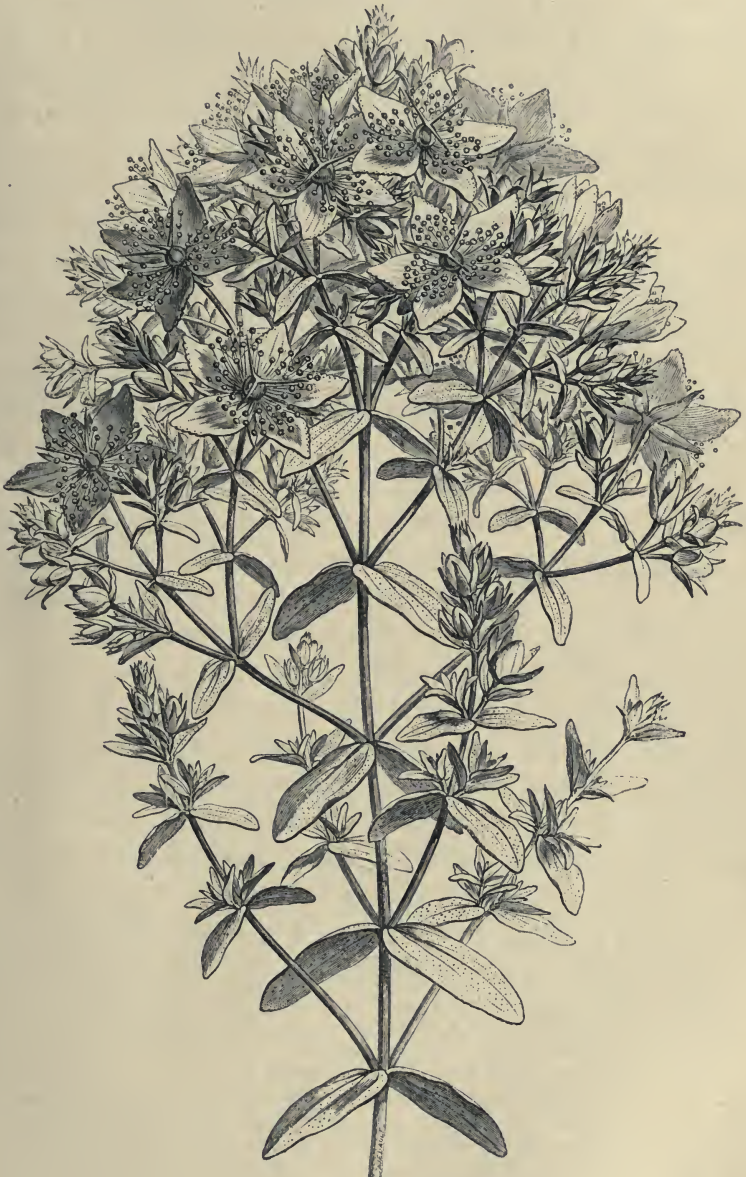

Fig. 339. Habit.

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[1] Pollen "ellipsoid 3-plicate; in water, spherical with 3 bands. *Vismia baccifera, guianensis, micrantha*" (H. Mohl, *Ann. Sc. Nat.* sér. 2, iii. 329).

found an equal number of hypogynous scales. The gynæcium, free and superior, is composed of an ovary with five alternipetalous cells,[1] surmounted by a style almost immediately divided into five branches, the stigmatiferous extremity of which is dilated to a small head. Near the internal angle of each ovarian cell is a placenta the two vertical lobes of which are covered with an indefinite number of small oblique or transverse anatropous ovules. The fruit is a berry, sometimes but little fleshy, and the seeds which it contains enclose under their coats a fleshy embryo, without albumen, straight or curved, with short radicle and elongate cotyledons, flattened or semi-cylindrical. *Vismia* consists of some fifteen species[2] of trees or shrubs growing in the tropical regions of America or Africa. The leaves are opposite, entire, without stipules, glabrous or downy, with translucid reservoirs of essential oil. The flowers[3] are at the extremities of the branches in clusters of cymes more or less ramified.

Vismia guianensis.

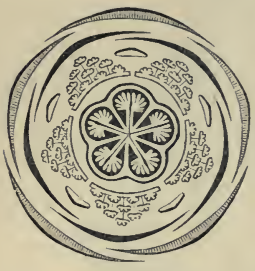

Fig. 342. Diagram.

The two genera *Haronga* and *Psorospermum*, growing in Madagascar and tropical western Africa, differ very little from *Vismia*, of which they have the flower and organs of vegetation. The fruit of *Haronga*[4] is a drupe of five stones, and in each of the ovarian cells, complete or incomplete, there are generally two or rarely three ascending, anatropous ovules, with the micropyle inferior and exterior. It consists of shrubs with opposite leaves and very numerous flowers,[5] collected in terminal compound or corymbiform cymes. Usually only one species is described.[6] *Psorospermum*[7] has in each ovarian cell only one or two ovules, directed like those of *Haronga*.[8] The fruit is wholly fleshy, but the embryo has convolute cotyledons. It consists of trees and shrubs, similar to *Vismia* in foliage, with more numerous but generally smaller flowers;[1] about a dozen species[2] have been described.[3]

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[1] Complete or incomplete.

[2] AUBL. *Guian.* t. 311, 312 (*Hypericum*).—H. B. K. *Nov. Gen. et Spec.* v. 181, t. 454 (*Vismia*). A. S.-H. *Fl. Bras. Mer.* i. t. 68.—GRISEB. *Fl. Brit. W.-Ind.* 111.—HOOK. F. *Niger*, 243.—OLIV. *Fl. Trop. Afr.* i. 160.—WALP. *Rep.* i. 391; v. 144; *Ann.* ii. 188; iv. 363; vii. 333.

[3] Yellow.

[4] DUP.-TH. *Nov. Gen. Madag.* 15.—DC. *Prodr.* i. 541 (part).—SPACH, *Suit. à Buffon*, v. 355; *Ann. Sc. Nat.* sér. 2, v. 350.—ENDL. *Gen.* n. 5468.—PAYER, *Fam. Nat.* 79.—B. H. *Gen.* 167, n. 8.—BAKER, *Fl. Maurit.* 15.—*Harongana* LAMK. *Ill.* t. 645.—*Arongana* PERS. *Enchirid.* ii. 91 (part).

[5] The anthers are at first introrse, and are early reversed (fig. 342).

[6] *H. madagascariensis* CHOIS. *Hypér.* 34; DC. *Prodr.* i. 541.—OLIV. *Fl. Trop. Afr.* i. 160.—*Arungana paniculata* PERS. *loc. cit.*—?*Psorospermum leonense* TURCZ. *Bull. Mosc.* xxxvi. 578.

[7] SPACH, *Ann. Sc. Nat.* sér. 2, v. 157, 350; *Suit. à Buffon*, v. 351.—ENDL. *Gen.* n. 5467.—B. H. *Gen.* 167, 980.

[8] Which perhaps might rather be made only a section with endocarp not hardened.

The name of *Cratoxyleæ* has been given to a small group of plants belonging to this family, characterized chiefly by their pericarp and seeds. The former is capsular, loculicidal, and opens in five pannels, and these sometimes divided into two halves at the partitions which separate. The seeds are ascending and surmounted by a vertical wing; the cotyledons of the contained embryo are generally longer than the radicle. The group consists of tropical trees and shrubs of the old world, with a yellow juice, opposite leaves, covered with glandular punctuations, pentamerous flowers, with triadelphous stamens. *Cratoxylon*[4] is Asiatic; in each ovarian cell are four or more ovules in two vertical series.[5] A dozen species[6] have been described. *Eliæa articulata*,[7] a shrub of Madagascar, with terminal cymes, has only

Hypericum (*Eremanthe*) *calycinum.*

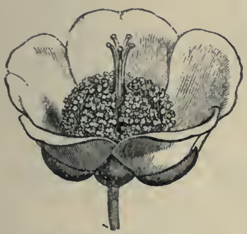

Fig. 344. Flower.

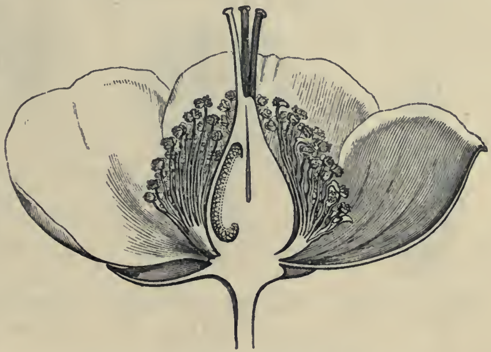

Fig. 345. Long. sect. of flower ($\frac{2}{1}$).

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[1] The sepals and petals are striated with black. The anthers are primarily introrse.

[2] L. *Amœn. Acad.* viii. 33 (*Hypericum*). — Guill. et Perr. *Fl. Seneg. Tent.* i. 107, t. 23 (*Vismia*).—Hook. f. *Niger*, 241, t. 21.—Oliv. *Fl. Trop. Afr.* i. 158.—Walp. *Rep.* i. 391; *Ann.* i. 128; ii. 189.

[3] Here is placed, on account of the drupaceous character of its fruit, but only provisionally retained by us, *Endodesmia calophylloides*, Benth. (*Gen.* 166, n. 5; *Oliv. Fl. Trop. Afr.* i. 157), a shrub of the Gaboon with opposite veined leaves like those of *Calophyllum*, and quite exceptional in this group by its very numerous stamens, inseparable within from a pentagonal tube (and consequently monadelphous), and especially by its unilocular ovary which encloses only a single descending seed. The place of this genus is perhaps rather among the *Clusiaceæ*; indeed it much resembles *Calophyllum*.

[4] Bl. *Bijdr.* 143.—Spach, *Ann. Sc. Nat.* sér. 2, v. 352.—Endl. *Gen.* n. 5472.—B. H. *Gen.* 166, n. 4.—*Hornschuchia* Bl. *Cat. Hort. Buitenz.* (ex Endl.).—*Ancistrolobus* Spach, *loc. cit.* t. 6 B; *Suit. à Buffon*, v. 360.—Endl. *Gen.* n. 5470.—*Tridesmis* Spach, *Ann. Sc. Nat.* sér. 2, v. 351, t. 6 A.

[5] They are more numerous in *Tridesmis*, which is also distinguished by a scale at the base of the petals; a character of very little importance.

[6] Miq. *Fl. Ind.-Bat.* i. p. ii. 515; Suppl. 194. —Bl. *Mus. Lugd.-Bat.* ii. 15, t. 5.—Korth. *Verh. Nat. Gesch. Bot.* t. 36, 37 (*Tridesmis*).— Walp. *Rep.* i. 391; *Ann.* iv. 362; vii. 333.

[7] Cambess. *Ann. Sc. Nat.* sér. 1, xx. 400, t. 13. —Spach, *Ann. Sc. Nat.* sér. 2, v. 351.—Endl. *Gen.* n. 5469.—B. H. *Gen.* 166, n. 3.—Walp. *Rep.* i. 391.—*Lanigerostemma* Chapel. herb.

two ovules in each ovarian cell; it is consequently to *Cratoxylon*[1] what *Haronga* is to *Vismia*.

Hyperieum hyrcinum.

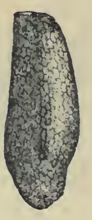

Fig. 348. Seed.

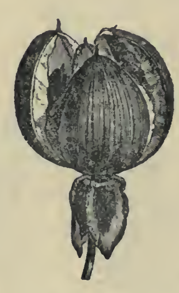

Fig. 346. Dehiscing fruit ($\frac{2}{1}$).

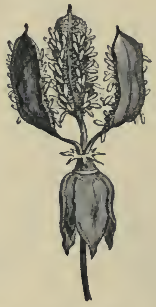

Fig. 347. Fruit, valves detached.

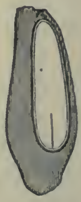

Fig. 349. Long. sect. of seed.

The St. John's Worts[2] (fig. 339, 344–353), forming more than three-fourths of the family and distributed among a great number of genera,[3] have, with the general characters of *Vismia* and the neighbouring genera, some particular traits which have served to distinguish a tribe of *Hypericeæ*. These are: petals internally glabrous and without appendages; a fruit dehiscing at the interlocular partitions or placentæ; and seeds not winged, the embryo of which, straight or curved, has cotyledons ordinarily longer than the radicle. In certain species with rather large flowers, cultivated in our gardens, and of which the genus *Eremanthe*[4] (fig. 344, 345) has been made, the flowers are formed like those of *Vismia*,

Hypericum perforatum.

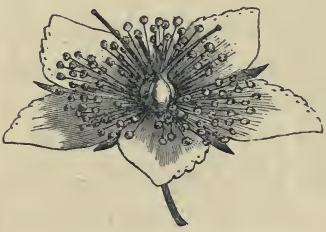

Fig. 350. Flower.

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[1] Of which it ought to constitute (?) only a section.

[2] *Hypericum* T. *Inst.* 254, t. 131.—L. *Gen.* n. 902.—Adans. *Fam. des Pl.* ii. 444.—J. *Gen.* 255. —Lamk. *Dict.* iv. 143; Suppl. iii. 693; *Ill.* t. 643.—DC. *Prodr.* i. 543.—Choisy, *Prodr. Monog. Hypér.* 37, t. 3–9.—Spach, *Suit. à Buffon*, v. 383; *Ann. Sc. Nat.* sér. 2, v. 356.—Endl. *Gen.* n. 5464. —Payer, *Organog.* 1, t. 1; *Fam. Nat.* 77.—B. H. *Gen.* 165, n. 2 (incl.: *Adenosepalum* Spach, *Adenotrias* Spach, *Androsœmum* All. *Brathydium* Spach, *Brathys* Mut. *Campylopos* Spach, *Campylosporus* Spach, *Coridium* Spach, *Crossophyllum* Spach, *Drosanthe* Spach, *Drosocarpium* Spach, *Elodea* Adans. *Elodes* Spach, *Holosepalum* Spach, *Isophyllum* Spach, *Milleporum* Spach, *Myriandra* Spach, *Norysca* Spach, *Psorophytum* Spach, *Roscyna* Spach, *Receveura* Velloz. *Sarothra* L. *Triadenia* Spach, *Tridia* Korth. *Webbia* Spach).

[3] Proposed especially by Spach. Treviranus (*Hyper. Gen. et Sp. Anim.* 1861) re-united them all in a single genus *Hypericum*. Bentham and Hooker distinguish only *Hypericum* and *Ascyrum*.

[4] Spach, *Suit. à Buffon*, v. 421; *Ann. Sc. Nat.* sér. 2, v. 363.—Payer, *Organog.* 3, t. 4; *Fam. Nat.* 77.

with five imbricate sepals, five alternate petals, twisted, five bundles of oppositipetalous stamens with introrse anthers,[1] and an ovary with five alternipetalous cells, complete or incomplete and multiovulate, surmounted by an equal number of stylary branches, capitate and stigmatiferous at the summit. The fruit is a septifragal capsule, the five valves of which have at the centre five polyspermous placentary plates. The seeds enclose under their multiple coats,[2] a fleshy and straight embryo, without albumen. These plants are sub-shrubby or herbaceous. Their leaves are opposite, without stipules, charged with punctiform and pellucid reservoirs filled with odorous essence. Their flowers are in cymes at the top of the branches.

With the same organs of vegetation, certain other St. John's Worts, of which the genus *Androsæmum*[3] has been made, have the same flower, except that their gynæcium is trimerous, the two lateral carpels being absent. The fruit may be a little fleshy at the time of maturity; then however it opens in three valves like a capsule.

Hypericum (Triadenia) Ægyptiacum.

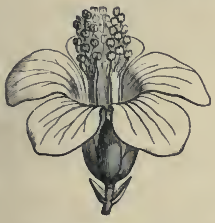

Fig. 351. Flower.

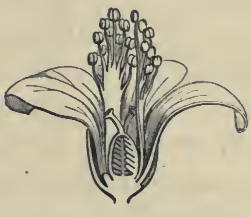

Fig. 352. Long. sect. of flower.

In *Hypericum* proper,[4] the fruit is capsular, and the gynæcium is reduced to three carpels; but so are also the bundles of stamens; so that there is only one anterior, oppositipetalous, and two lateral, superposed to sepals 4 and 5.[5]

Now, with the three carpels and three staminal bundles of the true *Hypericum*, let the flower have three glands alternating with the bundles of stamens and analogous to those of *Vismia*, and we shall have specimens of *Hypericum*, such as *H. virginium*, *Elodes*, *ægyptiacum* (fig. 351–353), which have been proposed as types of as many separate genera, under the names *Elodea*,[1] *Elodes*,[2] and *Triadenia*.[3]

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[1] The pollen is ellipsoid, as in *Hypericum* generally, with three folds, "external membrane formed of two bands pointed at the two ends which cross (*H. perforatum*, *H. quadrangulare*). The folds correspond to the angles of a tetrahedron (*H. perforatum*); ovoid; three folds, in water, a sphere having three bands with three papillæ (*H. hircinum*)."

[2] The exterior is often loose reticulate; the next hard, coloured, covering a third membranous.

[3] ALL. *Fl. Pedem.* n. 1440.—SPACH, *Suit à Buffon*, v. 414; *Ann. Sc. Nat. loc. cit.* 360.—PAYER, *Organog.* 3, t. 1; *Fam. Nat.* 78.

[4] *Hypericum* SPACH, *Suit. à Buffon*, v. 382: *Ann. Sc. Nat. loc. cit.* 356,

[5] "This special position of the staminal bundles clearly indicates that the reduction to three arises not by abortion but by the union of four bundles two and two." (PAYER.)

In *H. Drummondii*, a species from Florida, the flowers are those of *Hypericum* (such as *Brathys*, for example); but the type is quaternary instead of quinary. The four sepals are imbricate and nearly equal to each other; whence the generic name *Isophyllum*,[4] which has been proposed for this plant.

Hypericum ægyptiacum.

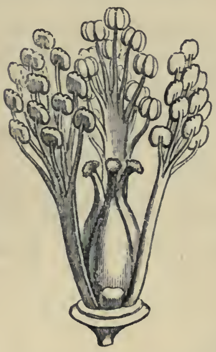

Fig. 353. Flower, perianth removed ($\frac{4}{1}$).

The flower is equally tetramerous in other American species, such as *H. amplexicaule*, *multicaule*, *pauciflorum*, *Crux Andreæ*, etc.; but of the four decussate sepals, the two more interior are much less developed than the two others; of these the genus *Ascyrum*[5] has been made.

With all these variations in the flower,[6] the St. John's Worts present as common characters: opposite leaves, generally punctate; definite inflorescence; numerous stamens; septicidal or septifragal (not loculicidal) fruit; seeds destitute of wing and an embryo without albumen. About two hundred species[1] have been described; it will doubtless be necessary to reduce them by one fourth. They are found in both worlds; more frequent in the temperate regions of the northern hemisphere, they are less numerous in the southern and in the mountains of tropical countries; there are few in south Africa and Australia, and they are wanting, it is said, in the arctic and antarctic regions.

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[1] Adans. *Fam. des Pl.* ii. 442.—Spach, *Suit. à Buffon*, v. 363; *Ann. Sc. Nat.* sér. 2, v. 165, 353.—Endl. *Gen.* n. 5465.

[2] Spach, *Suit. à Buffon*, v. 369; *Ann. Sc. Nat. loc. cit.* 171, 353.—Payer, *Organog.* 3, t. 1; *Fam. Nat.* 79.

[3] Spach, *Suit. à Buffon*, v. 370; *Ann. Sc. Nat. loc. cit.* 172, 354, t. 4, 5. M. Spach has established in this group many genera which may be retained as so many distinct subgenera. They may be grouped in two series. To the first, besides *Euhypericum*, *Androsæmum*, *Eremanthe*, belong *Drosanthe* (Spach, *Ann. Sc. Nat. loc. cit.* 355), which has denticulate or pectinate sepals 3-adelphous stamens and an osseous placenta; *Webbia* (Spach, *loc. cit.* 356), whose stamens are also 3-adelphous, with seeds spongy without; *Olympia* (Spach, *loc. cit.* 359), which with the flowers of *Euhypericum*, has very unequal sepals (the 3 interior being much smaller); *Campylopus* and *Psorophytum* (Spach, *loc. cit.* 360), very near *Androsæmum*; *Campylosporus*, *Norysca*, and *Roscyna* (Spach, *loc. cit.* 363, 364), the flower of which much resembles that of *Eremanthe*; *Brathys* (Mut. ex L. fil. *Suppl.* 43), *Myriandra* and *Brathydium* (Spach, *loc. cit.* 364, 365), in which the bundles of the andrœcium are indistinct at adult age, though the study of development shows that they exist at the beginning. *Eremosporus* (Spach, *loc. cit.* 355) has thick and cymbiform monospermous carpels. (Those we have seen appeared altered, perhaps by the puncture of an insect.) The habit of the plant is that of *H. linearifolium*. Whilst in this first series the interstaminal glands are wanting, they are developed in the second, where the stamens are 3-adelphous. Beside *Elodea*, *Elodes*, and *Triadenia*, it includes *Adenotrias* (Jaub. and Spach, *Ill. Pl. Or.* 76, t. 39), differing from *Triadenia* chiefly by their biovulate ovarian cells, *Thymopsis* of the same authors (*loc. cit.* 72, t. 37) differs from the true *Hypericum* by its campanulate calyx and the almost definite number of the ovules. *Sarothra* L. (*Gen.* n. 383) and *Receveura* Velloz. (*Fl. Flum.* v. t. 119, 120) are referred to *Brathys*. *Tridia* Korth. (*Tijdschr.* iii. 17, t. 1) is supposed (B. H. *Gen.* 165) identical with *Hypericum japonicum*.

[4] Spach, *Suit. à Buffon*, v. 432; *Ann. Sc. Nat.* sér. 2, v. 367.

[5] L. *Gen.* n. 903.—Nutt. *Gen.* ii. 15.—Chois. *Hypér.* 60; DC. *Prodr.* i. 55.—Spach, *Ann. Sc. Nat. loc. cit.* 368; *Suit. à Buffon*, v. 456.—Endl. *Gen.* n. 5463.—A. Gray, *Gen. Ill.* t. 91.—B. H. *Gen.* 164, n. 1. There are calyces with very unequal sepals among the *Roscyna* and *Brathydineæ*, and the flowers of these latter may be here and there tetramerous.

[6] Yellow, rarely white.

This small family was established by A.-L. DE JUSSIEU in 1789,[2] under the name of *Hyperica*, St. John's Worts; it included *Ascyrum*, *Brathys*, and *Hypericum*. CHOISY published at Geneva, in 1821, the *Prodrome d'une Monographie des Hypericinées*, and wrote the exposition of this family for the *Prodromus* of A.-P. DE CANDOLLE;[3] it there comprised *Haronga*, *Vismia*, *Androsæmum*, *Hypericum*, *Lancretia*,[4] *Ascyrum*, *Carpodontos*, and *Eucryphia*.[5] Twelve years later SPACH,[6] studying this family fundamentally, distinguished twenty-six genera, and afterwards[7] twenty-eight, nearly all dismembered from the old genus *Hypericum*. In 1861, TREVIRANUS[8] re-established this genus in its former integrity, and was followed therein, the following year, by BENTHAM and HOOKER,[9] who described the genus *Endodesmia* and retained only eight genera, reduced here to seven by the union of *Ascyrum* to *Hypericum*. The species comprised, numbering about two hundred, are pretty equally distributed over both worlds, especially the St. John's Worts, which, wanting only in the arctic and antarctic regions, are found in all five divisions of the world. *Haronga* and *Psorospermum* are from tropical western Africa, the native country of *Endodesmia*, and from Madagascar where *Eliæa* grows. *Crato-*

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[1] H. B. K. *Nov. Gen. et Sp.* v. 185, t. 455–460. —A. S.-H. *Pl. Us. Bras.* t. 61, 62.—DELESS. *Ic. Sel.* iii. t. 27.—JAUB. and SPACH, *Ill. Pl. Or.* i. t. 16–33, 34–36 (*Drosanthe*), 37 (*Thymopsis*), 38 (*Androsæmum*), 39 (*Adenotrias*).—REICHB. *Ic. Fl. Germ.* vi. t. 342–351.—GRISEB. *Fl. Brit. W.-Ind.* 111 (*Ascyrum*).—THW. *Enum. Pl. Zeyl.* 48. —MIQ. *Fl. Ind.-Bat.* i. p. ii. 513 (*Brathys*), 514 (*Norysca*).—HOOK. F. *Handb. N.-Zeal. Fl.* 28.—BENTH. *Fl. Hongk.* 23; *Fl. Austral.* i. 181.—TRI. and PL. *Ann. Sc. Nat.* sér. 4, xviii. 290.—HARV. and SOND. *Fl. Cap.* i. 117.—OLIV. *Fl. Trop. Afr.* i. 154.—BOISS. *Fl. Or.* i. 783 (*Triadenia*), 784.—GREN. and GODR. *Fl. de Fr.* i. 314, 320 (*Elodes*).—*Bot. Mag.* t. 137, 146, 178, 4949, etc.—WALP. *Rep.* i. 383; ii. 805; v. 141, 142 (*Thymopsis*), 143 (*Adenotrias*); *Ann.* i. 126, 960; ii. 184; iv. 357, 359 (*Noryeca*), 360 (*Roscyna*, *Brathys*, *Elodea*); vii. 327, 332 (*Norysca*).

[2] *Gen. Plant.* 254, Ord. 8.

[3] I. 541 (1824), Ord. 84 (*Hypericineæ*).

[4] Syn. of *Bergia* (*Elatineæ*).

[5] Abnormal *Rosaceæ* (see vol. i. 401).

[6] *Suit. à Buffon*, v. 335; *Ann. Sc. Nat.* sér. 2, v. 157, 349.

[7] *Ill. Pl. Or.* i. 31–77 (1842).

[8] *Hyper. Gen. et Spec. Animadversion.*

[9] *Gen.* i. 163, Ord. 26.

xylon is entirely from tropical Asia, and *Vismia* from central America, except four or five African species. In our view, according to what has been said above,[1] these plants are *Myrtaceæ* with a convex receptacle and a gynæcium constantly free. We at the same time recognize their affinities with the *Cistaceæ*, near which ADANSON[2] formerly placed them, and we shall see that it is almost impossible to distinguish them absolutely from the *Clusiaceæ*.

USES.[3]—The *Hypericaceæ* are rich in essential oil and gum-resinous juices, often balsamic. In addition a bitter extractive principle exists in the bark of many species. In the American species of *Vismia*, particularly *V. Caparosa*,[4] *micratha*,[5] *longifolia*,[6] *latifolia*,[7] *sessifolia*,[8] *laccifera*,[9] and *cayennensis*,[10] the resinous juice, yellow or reddish, has drastic properties; it is sometimes brought to Europe under the name of American gum-gutta. *V. guianensis*[11] (fig. 340–343), bearing in Guyana the name of *Fever tree*,[12] has also a purgative juice useful in the treatment of skin diseases. Its wood is employed in building, and huts are covered with its inner bark. In Sierra Leone and Angola *Psorospermum febrifugum*[13] has the same internal uses as *Vismia guianensis*. *Cratoxylon Hornschuchii*[14] is considered diuretic and slightly astringent in Java. The St. John's Worts formerly had a similar reputation in Europe. They were esteemed as balsamic, bitter, vermifuge, vulnerary, etc. Sometimes they were also employed in dyeing and in the preparation of leather. The most celebrated was *Hypericum perforatum*[15] (fig. 339, 350), which has been prescribed for madness, dysentery, and pains in the joints. Its leaves and flowers dye yellow, and the Swedes colour corn-spirit with its buds. An odorous oil distilled from its leaves was formerly employed in medicine.[1] *H. Androsæmum*[2] was in equal repute under the name of *Heal-all*.[3] It was prescribed for insanity, burns, hæmorrhage, wounds. *H. hircinum*[4] (fig. 346–349), the odour of which is so strong, was used in the treatment of dysmenorrhea and strangury; *H. Coris*, *montanum*, *ciliatum*, etc., as astringents and balsamics. Many other European species[5] have analogous properties. In the United States, a stomachic tincture is prepared from *H. virginicum*,[6] the flowers chiefly being employed. In Brazil *H. laxiusculum*[7] is extolled as alexipharmic and *H. connatum*[8] as useful in cases of angina and stomatite. *H. Sarothra*,[9] of North America, is said to be vulnerary. At Quito *H. laricifolium*[10] is considered astringent; its flowers are used for dyeing a saffron yellow. At Bourbon an odorous balsam is extracted from *H. lanceolatum*,[11] prescribed in gouty and syphilitic affections. In the North of Europe *H. Elodes*[12] is used to dye red and yellow. Species of *Hypericum* of the section *Ascyrum*[13] have been employed as astringents and resolutives; the seeds are considered purgative. Some evergreen and subshrubby species of this genus are cultivated in our gardens as ornamental.[14]

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[1] See page 335.

[2] *Fam. des Pl.* ii. 444.

[3] ENDL. *Enchirid.* 540.—GUIB. *Drog. Simpl.* éd. 6, iii. 617.—LINDL. *Fl. Med.* 117; *Veg. Kingd.* (1846) 406.—ROSENTH. *Syn. Pl. Diaphor.* 748.

[4] H. B. K. *Nov. Gen. et Spec.* v. 182.

MART. ex ROSENTH. *op. cit.* 751.

[6] A. S.-H. *Fl. Bras. Mer.* i. 826, t. 68.

[7] CHOIS. *Prodr. Hypér.* 36.—*Hypericum latifolium* AUBL. *Guian.* ii. 787, t. 312, fig. 1.

[8] PERS. *loc. cit.* — *Hypericum sessilifolium* AUBL. *Guian.* ii. 787, t. 312, fig. 2.

[9] MART. ex ROSENTH. *loc. cit.*

[10] PERS. *Syn.* ii. 86.—*Hypericum cayennense* L. *Amæn.* viii. 321 (*Bois Baptiste*).

[11] PERS. *loc. cit.*—A. S.-H. *Fl. Bras. Mer.* i. 327.—CHOIS. DC. *Prodr.* i. 542.—*Hypericum guianense* AUBL. *Guian.* ii. 784, t. 311.—LINDL. *Fl. Med.* 118.

[12] *Bois sanglant*, *B. à dartres*, *B. cossais*, *B. d'acossais.*

[13] SPACH, *Ann. Sc. Nat.* sér. 2, v. 163.—*P. ferrugineum* HOOK. F.—*Haronga febrifuga* STEUD.

[14] BL. *Bijdr.* 143.

[15] L. *Spec.* 1105.—DC. *Prodr.* i. 549, n. 70.—LINDL. *Fl. Med.* 117.—MÉR. et DEL. *Dict. Mat. Méd.* iii. 576.—GUIB. *Drog. Simpl.* éd. 6, iii. 617, fig. 737.—GREN. et GODR. *Fl. de Fr.* i. 314.—CAZ. *Pl. Méd. Indig.* éd. 3, 644.—ROSENTH. *op. cit.* 748.—*H. vulgare* LAMK. *Fl. Fr.* iii. 151.—*H. officinarum* CRANTZ. *Fl. Austr.* 99 (*Herbe Saint-Jean*, *H. à mille trous*, *H. aux piqûres*, *Trucheran*, *Chasse-diable*, *Fuga dæmonum*).

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[1] It forms an ingredient of several balsams. The petals contain a yellow principle, soluble in water; the pistil and fruit, a reddish resinous substance, soluble in oil, alcohol, etc.

[2] L. *Spec.* 1102.—Guib. *loc. cit.* 617.—*H. bacciferum* Lamk. *Fl. Fr.* iii. 151.—H. Bn. *Dict. Encycl. Sc. Méd.* iv. 322.—*Androsæmum officinale* All. *Fl. Pedem.* ii. 47.—Lindl. *Fl. Med.* 117.—Rosenth. *op. cit.* 750.—*A. vulgare* Gærtn. *Fruct.* i. 282, t. 59, fig. 2.

[3] *Parcœur*, *Herbe des grands bois.*

[4] L. *Spec.* 1103.—Gren. et Godr. *Fl. de Fr.* i. 320.—*Androsæmum fœtidum* Spach.

[5] *H. quadrangulum* L. *tetrapterum* Fries. *crispum* L. *olympicum* L. *origanifolium* W. *humifusum* L. *empetrifolium* W. etc. (Rosenth. *op. cit.* 749).

[6] L. *Spec.* 1104.—Andr. *Bot. Repos.* t. 552.—DC. *Prodr.* iii. 546, n. 30.—*Elodea virginica* Nutt.—*E. campanulata* Pursh.

[7] A. S.-H. *Pl. Us. Bras.* t. 62 (*Alecrim bravo*).

[8] Lamk. *Dict.* iv. 168, n. 55.—A. S.-H. *op. cit.* t. 61.—Rosenth. *op. cit.* 750.—*Brathys connata* Spach (*Orelha de gato*).

[9] Michx. *Fl. Bor.-Amer.* ii. 81.—*Sarothra gentianoides* L.—*S. hypericoides* Nutt.—Rosenth. *op. cit.* 751.

[10] J. *Ann. Mus.* iii. 160, t. 16, fig. 1.—*Brathys laricifolia* Spach.

[11] Lamk. *Dict.* iv. 145, n. 3.—*Campylosporus reticulatus* Spach (*Ambaville*, *Fleur jaune*).

[12] L. *Spec.* 1106.—DC. *Fl. Fr.* iv. 866.—*Elodes palustris* Spach, *Ann. Sc. Nat.* sér. 2, v. 171.—Gren. et Godr. *Fl. de Fr.* i. 320.—*H. pulchrum* L. *elegans* Steph. *Richeri* Vill. (*barbatum* All.) have also been used in dyeing.

[13] Especially *A. hypericoides* L. and *stans* Michx.

[14] *Bot. Mag.* t. 137, 146, 178, 3277, 4949, 5693. Carr. *Rev. Hort.* (1875) 170, c. ic.

GENERA.

1. **Vismia** Vandell.—Flowers hermaphrodite regular; receptacle convex. Sepals 5, thick subcoriaceous, abruptly attenuate at margin, shortly imbricate. Petals 5, alternate, oftener villose above, twisted in prefloration. Stamens ∞, in 5 bundles, superposed to petals; filaments free at apex; anthers short introrse, afterwards reflexed and retrorse, longitudinally 2-rimose. Scales 5, hypogynous, alternipetalous. Germen free, 5-locular; cells complete or incomplete alternipetalous; style branches 5, distinct from base, at apex capitellate stigmatose. Ovules in cells ∞, inserted in internal angle, anatropous. Fruit baccate, indehiscent. Seeds ∞, ascending or subhorizontal, inserted on placenta with lobes often spongy, subcylindrical; cotyledons of straight or more rarely incurved exalbuminous embryo plane or semiterete; radicle short.—Trees or shrubs; with yellow or red juice; leaves opposite exstipulate, entire, glabrous or tomentose beneath, penninerved glandular punctate; flowers in terminal more or less compound racemose cymes. (*Trop. America, trop. west. Africa.*)—See p. 382.

2. **Haronga** Dup.-Th.—Flowers nearly of *Vismia*, hermaphrodite, 5-merous; ovules in each cell (complete or incomplete) few (2, 3), ascending; micropyle extrorsely inferior. Fruit drupaceous (small) globose; pyrenes 5, 1-2-spermous. Seeds terete; cotyledons of exalbuminous embryo plane elongate; radicle shorter.—A shrub; leaves entire and other characters of *Vismia*; flowers (small) crowded in a terminal very racemose-decompound raceme. (*Trop. Africa, Madagascar.*)—See p. 384.

3 ? **Psorospermum** Spach.—Flowers nearly of *Vismia*; ovules in each cell (complete or incomplete) 1, 2, ascending; micropyle

extrorsely inferior. Fruit baccate, indehiscent. Seeds few ascending; cotyledons of straight embryo convolute.—Trees or shrubs often stellately pubescent; habit, leaves, etc., of *Vismia*; flowers crowded (smaller) in very compound cymiferous racemes. (*Trop. Africa, Malacca.*)—See p. 384.

4? **Endodesmia** BENTH.[1]—Flowers hermaphrodite, 5-merous; sepals 5, coriaceous, imbricate, afterwards not contiguous. Petals 5, alternate, unequal at base, sometimes thinner subauriculate, twisted. Stamens ∞, in 5 bundles, inserted within petaloid tube, 5-dentate at apex; anthers crowded (small) introrse apiculate, 2-rimose. Germen superior, girt at base with short thick hypogynous disk, 1-locular; style slender eccentric, apex stigmatose not incrassate. Ovule 1, inserted under apex of cell descending; funicle rather thick; micropyle extrorsely superior. Fruit drupaceous oblong; mesocarp thin; endocarp crustaceous, externally resinous-cellulose. Seed descending; cotyledons of exalbuminous embryo fleshy; radicle very short, superior.—A shrub; leaves opposite coriaceous; primary nerves pinnate very close lineate parallel; flowers in ramose corymbiform cymes. (*Trop. west. Africa.*)—See p. 385.

5. **Cratoxylon** BL.—Flowers nearly of *Vismia*, 5-merous; sepals 5, imbricate. Petals 5, alternate, contorted or imbricate, at base naked within or more rarely appendiculate (*Tridesmis*). Stamens ∞ (of *Vismia*), 3-adelphous. Glandules 3, squamiform, alternating with bundles. Germen 3-locular; styles 3, stigmatose at apex. Ovules in cells (complete or incomplete) 4–∞, 2-seriately ascending; micropyle extrorsely inferior. Capsule loculicidally 3-valvate; valves septiferous in middle. Seeds ∞, produced above to ascending dorsal wing; cotyledons of straight embryo generally longer than radicle.—Trees or shrubs; leaves opposite entire (herbaceous) pellucid punctate, flowers axillary solitary or oftener cymose, sometimes in terminal cymiferous raceme. (*Asia and trop. Oceania.*)—See p. 385.

6? **Eliæa** CAMBESS.[1]—Flowers nearly of *Cratoxylon*, 5-merous; petals at base minutely appendiculate within. Bundles of stamens and alternate glandules 3; connective minutely glandular at apex. Ovules in incomplete cells (3), 2, ascending; micropyle extrorsely inferior. Seeds, etc., of *Cratoxylon*; valves of capsule 3, loculicidally

2-partite; exocarp finally separating from mesocarp.—A shrub; leaves, inflorescence, etc., of *Cratoxylon*. (*Madagascar.*) — See p. 385.

7. **Hypericum** T.—Flowers 5-merous or more rarely (*Ascyrum*) 4-merous; sepals equal or sometimes very unequal (the interior much smaller), imbricate, glabrous or glanduliferous; glandules often capitate stipitate (nigrescent). Petals same in number alternate, naked within, oftener contorted, rarely imbricate. Stamens ∞, in 5, or 3 (or more rarely 6–8) oppositipetalous bundles; filaments long or more rarely very shortly connate below in bundles, sometimes subfree (*Brathys*); anthers small, introrse, 2-rimose. Glandules hypogynous alternating with bundles of stamens 3, or 0. Germen free; cells 3–5, subcomplete or oftener more or less incomplete; styles same in number free or rarely connate below, at apex more or less dilated stigmatose. Ovules on each placenta ∞, more rarely few, anatropous. Fruit capsular, or fleshy before maturity (*Androsæmum*), septicidal or sometimes more rarely rupturing; placentæ solute from axis or finally from valves. Seeds exalate ∞, sometimes rather fleshy or cellulose without; cotyledons of straight or rarely incurved, cylindrical or oblong embryo shorter than terete radicle or sometimes very short.— Odorous shrubs undershrubs or herbs; leaves opposite or more rarely verticillate, simple entire or glandular-serrate or dentate, penninerved, pellucid-punctate, exstipulate; flowers terminal, more rarely axillary, solitary or oftener in simple or racemosely compound cymes regular or 1-lateral from base or above. (*Temperate and warm mountainous regions of both hemispheres.*)—See p. 386.

LVI. CLUSIACEÆ.

I. CLUSIA SERIES.

In this family, which also bears the name of *Guttiferæ*, because it includes the plant which produces the Gum-gutta (fig. 354, 378), we may first study *Clusia*[1] (fig. 355–360), the flowers of which are polygamous or diœcious. The receptacle, slightly convex, bears first

Garcinia Morella.

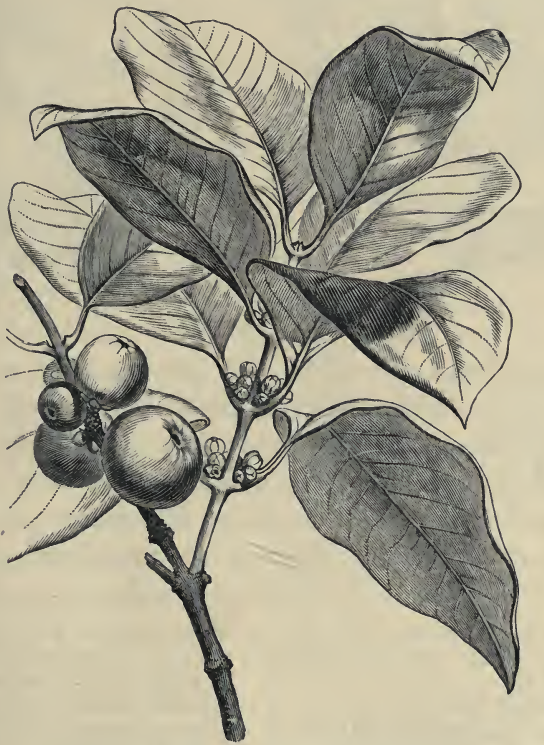

Fig. 354. Floriferous and fructiferous branch.

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[1] L. *Gen.* n. 1154.—ADANS. *Fam. des Pl.* ii. 355.—J. *Gen.* 256.—LAMK. *Dict.* ii. 52; Suppl. ii. 302; *Ill.* t. 852.—CAMBESS. *Mém. Mus.* xvi. 420.—CHOIS. *Mém. Soc. Linn. Par.* i. p. ii. (ex DC.); DC. *Prodr.* i. 558 (part).—SPACH, *Suit. à Buffon*, v. 310.—ENDL. *Gen.* n. 5438.—PL. et TRI. *Ann. Sc. Nat.* sér. 4, xiii. 318.—B. H. *Gen.* 170, n. 1.—H. BN. *Payer Fam. Nat.* 269 (incl.: *Androstylium* MIQ. *Arrudea* A. S.-H. *Astrotheca* MIERS, *Cahotia* KARST. *Cochlanthera* CHOIS. *Criuva* B. H. *Lipophyllum* MIERS, *Oxystemon* PL. et TRI. *Polythecandra* PL. et TRI. *Quapoya* AUBL.

a certain number of imbricate folioles, generally smaller and thicker as they are more exterior. The interior are larger, membranous, coloured;[1] these are the petals varying in number from four to eight or ten. The more exterior or sepals, often decussate,[2] are from four to ten in number, and often persist at the base of the fruit. The stamens are numerous in the male flowers (fig. 357). They are furnished with filaments free or united to a variable extent, forming sometimes a column of very various height and sometimes a nearly globular mass. Anthers may be wanting in the interior and exterior, or, where developed, may be exserted or immerged, and open in a very variable manner;[3] they are formed of two or of a great number of cells or cellules.[4] In the centre of the andrœcium, there may be a rudimentary gynæcium more or less prominent. In the female

Clusia rosea.

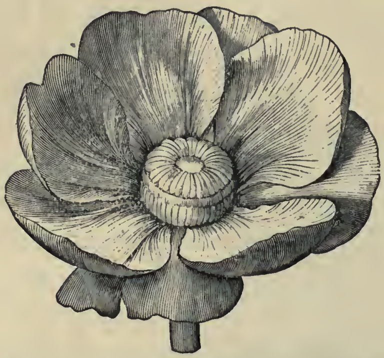
Fig. 355. Female flower seen from above (½).

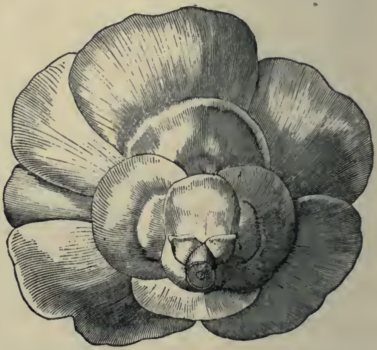
Fig. 356. Female flower seen from below.

(part), *Sphærandra* Pl. et. Tri. *Triplandron* Benth. *Xanthe* Schreb.).—*Cenchramidea* Pluk. (ex Adans. *loc. cit.*).

[1] White, pink, or yellow.

[2] They often graduate imperceptibly to bracts, and these are numerous and decussate in *Arrudea* (A. S.-H. *Fl. Bras. Mer.* i. 318, t. 66;—Endl. *Gen.* n. 5439; Pl. et Tri. *Ann. Sc. Nat.* sér. 4, xiv. 230), referred by MM. Bentham and Hooker to the section *Phloianthera* of the genus *Clusia*. It is the same in the sepals of *Oxystemon* (Pl. et Tri. *Ann. Sc. Nat.* sér. 3, xiii. 314; xiv. 226), referred by the same authors to the sect. *Euclusia* of the genus *Clusia*.

[3] On these characters are based the three sections retained in this genus (B. H. *loc. cit.*): "1. *Euclusia* (Pl. et Tri.). Exterior stamens numerous fertile with linear free anthers, interior stamens sterile and united in a spherical mass.—2. *Sphærandra* (Pl. et Tri.). Stamens all united in a solid spherical or elongate mass with anthers imbedded in the summit adnate or slightly prominent. To this are referred the sections of the authors cited: *Omphalanthera*, *Gomphanthera*, *Phloianthera*, and *Retinostemon*, with its 6 sub-sections or distinct types.—3. *Criuva*. Staminal filaments short, free, or more or less united at base. To this are referred the sections of the authors cited: *Cordylandra*, *Clusiastrum*, *Stauroclusia*, *Cruviopsis*, *Criuva*, *and Anandrogyne*."

4. In *C. insignis* the pollen-grain is a "flattened sphere, with three very short folds similar to the pores." (H. Mohl, *Ann. Sc. Nat.* sér. 2. iii. 329.)

flowers, the sterile stamens are definite in number (from 5 to 10) or indefinite; they surround the base of the ovary, and are free or united to a certain extent. The gynæcium is sessile, with a 4–10-celled ovary, surmounted by a style rarely erect and cylindrical, much more frequently divided from the base into a variable number (4–10) of thick radiating reflexed entire or crenated lobes. In the internal angle of each cell are numerous transverse or slightly oblique and anatropous ovules, with the micropyle turned from the side of the placenta.[1] The fruit is spherical or ovoid, coriaceous or fleshy, but finally septicidal, with thick valves which separate from an angular column, charged with seeds. The latter variable in number, sometimes few, as in *C. Pana-panari*[2] (fig. 359, 360), are small, covered with a fleshy aril, complete or incomplete, and enclose under their coats a large fleshy and macropod embryo, with cotyledons very small relatively to the thick ovoid radicle (fig. 358).

Clusia ovigera.

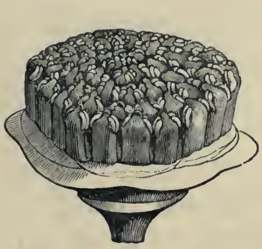

Fig. 357. Male flower without perianth. ($\frac{3}{1}$).

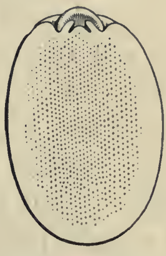

Fig. 358. Long sect. of embryo.

Clusia Pana-panari.

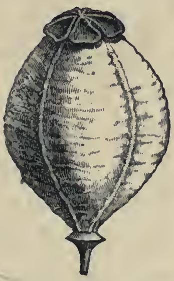

Fig. 359. Fruit ($\frac{4}{1}$).

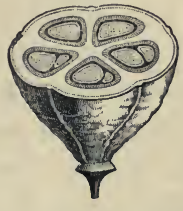

Fig. 360. Transverse sect. of fruit.

This genus has been divided into numerous sections,[3] according to the character of the andrœcium. This may serve to distinguish *Clusia* proper,[4] with exterior and interior stamens sterile and anthers free and linear, *Criuva*,[5] in which the staminal filaments are short (fig. 357) free, or more or less connate below, and *Arrudea*, which has all the stamens united in a solid mass, in which are imbedded the anthers, sometimes but slightly projecting at the exterior. These anthers open sometimes by pores and oftener by longitudinal, lateral or introrse clefts. Thus constituted,[1] the genus *Clusia* comprises some sixty species.[2] They are trees or shrubs with gummy resinous latex, often yellow; they are ordinarily glabrous, sometimes sarmentous and climbing, often living as parasites (true or false) upon the trunks of trees, which they finally kill.[3] The leaves are opposite, without stipules, thick, coriaceous, entire, penninerved, with a single visible median nervure or with five parallel nervures in great number. The flowers are terminal or solitary, or in cymes. Under the calyx are two bracts, or a larger number of decussate-alternate folioles which mingle imperceptibly with the sepals. All belong to the warm regions of America, from Mexico to Paraguay.

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[1] They have a double coat.

[2] CHOIS. DC. *Prodr.* i. 559, n. 13.—H. BN. *Payer Fam. Nat.* 269.—*Quapoya Pana-panari* AUBL. *Guian.* 901, t. 344.

[3] 16 (PL. et TRI. *Ann. Sc. Nat.* sér. 4, xiii. 318).

[4] *Euclusia* (p. 396, note 3).

[5] B. H. not PL. et TRI. (p. 396, note 3). To the sect. *Sphærandra* (same note) BENTHAM and HOOKER refer *Triplandron* BENTH. (*Sulph.* 73, t. 38) *Arrudea* A. S.-H. *Polythecandra* PL. et TRI. (*loc. cit.* xiii. 314) *Astrotheca* MIERS (ex PL. et TRI. *loc. cit.* xiv. 254), *Cahotia* KARST. *Linnæa*,

Beside *Clusia* is placed *Quapoya*[4] (fig. 361–366), which differs from it in the definite number of stamens, and also in the arrangement of the two vertical series of ovules, sometimes few and ascending,[5] sometimes more numerous and transverse or nearly so. In the prototype of the series, *Q. scandens*, there are ten stamens united by their filaments to a common tube, at the bottom of which is seen a rudimentary gynæcium. The obcuneiform anthers are free almost only at the summit of the tube, and present two linear and marginal cells (fig. 361). In other species of the same genus, to which the name *Rengifa*[6] has been given, there are from five to ten stamens, the filaments of which are all likewise united in a shorter tube, except at the summit, which may be independent. The anthers are formed like those of *Q. scandens*, and the number of

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xxviii. 448) and the *Quapoya Pana-panari* (p. 397, note 2). They consider *Cochlanthera* (Chois. *Gutt. Ind.* 46, t. 3) and *Lipophyllum* (Miers, *Trans. Linn. Soc.* xxi. 251, t. 26) as belonging to the sect. *Criuva*.

[1] From what precedes we can admit six sections in the genus, viz. *Euclusia*, *Sphærandra*, and *Criuva*, as conceived by Bentham and Hooker, and in addition *Arrudea*, *Cochlanthera*, and *Oxystemon*.

[2] A. S.-H. *Fl. Bras. Mer.* i. t. 65.—Mart. *Nov. Gen. et Sp.* iii. 104, t. 288.—Miq. *St. Surin.* t. 25, 26.—Chois. *Gutt. Ind.* t. 1–3.—Turp. *Dict. Sc. Nat.* Atl. t. 156, 157.—Griseb. *Fl. Brit. W.-Ind.* 106.—Seem. *Bot. Herald*, 88.—Gardn. *Hook. Lond. Journ.* ii. 334 (*Tocomita*).—Benth. *Hook. Lond. Journ.* ii. 368.—Walf. *Rep.* i. 393; ii. 811; v. 144; *Ann.* i. 128; ii. 190; iv. 364; vii. 338.

[3] Whence the common names *Figuiers maudits*, *Mille-pieds*, etc.

[4] Aubl. *Guian.* 897, t. 343 (not 344).—Endl. *Gen.* n. 5437 (part).—Pl. et Tri. *Ann. Sc. Nat.* sér. 4. xiv. 240 (part).—H. Bn. *Bull. Soc. Linn. Par.* [1876] 77.—*Xanthe* Schreb. *Gen.* 710 (incl.: *Balboa* Pl. et Tri. *Havetiopsis* Pl. et Tri. *Havetiella* Pl. et Tri. *Œdematopus* Pl. et Tri. *Renggeria* Meissn. *Rengifa* Pœpp. et Endl.).

[5] With micropyle exterior and inferior.

[6] Pœpp. et Endl. *Nov. Gen. et Sp.* iii. 12, t. 210.—Pl. et Tri. *Ann. Sc. Nat.* sér. 4, xiv. 210.—B. H. *Gen.* 171, n. 3.

ovules may diminish to two in each cell.[1] In *Renggeria*,[2] rightly referred as a section to the same genus, there are ten stamens, the filaments of which are united in a short and thick tube, at the summit of which the anthers display their two distinct and divergent cells. In *Havetiopsis*,[3] which we do not separate generically from the preceding types, there are often only four stamens, monadelphous below, but the anthers of which become introrse. Some, which have been named *Oligospora*,[4] have only from two to four ascending ovules in each cell; others (*Havetiella*[5]) have a greater number. *Balboa*[6] comprises species of *Havetiopsis*, the stamens of which, four to six in number, are surrounded by four petals of variable imbrication and not constantly decussate. In *Œdematopus*,[7] generically confounded by the most recent authors[8] with *Havetiopsis*, the stamens have the same configuration as in the true *Quapoya*; but their

Quapoya (Rengifa) scandens.

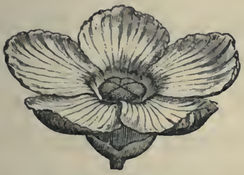
Fig. 362. Female flower.

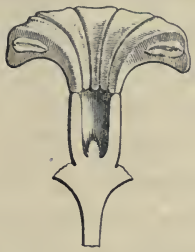
Fig. 361. Andrœcium.

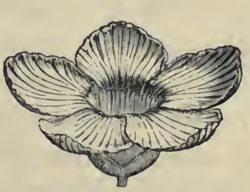
Fig. 363. Female perianth.

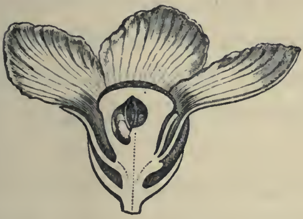
Fig. 365. Long. sect. of female flower.

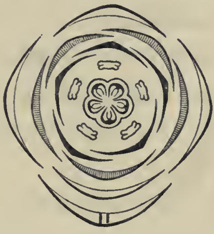
Fig. 364. Diagram of female flower.

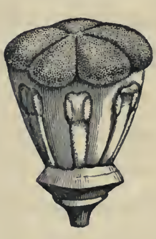
Fig. 366. Female flower, perianth removed.

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[1] They are ascending when they are few in number, and approach the horizontal direction as the number increases.

[2] Meissn. *Gen.* 42; *Comm.* 31.—Endl. *Gen.* n. 5436.—H. Bn. *Payer Fam. Nat.* 270.—*Schweiggera* Mart. *Nov. Gen. et Sp.* iii. 166, t. 297, fig. ii.

[3] Pl. et Tri. *Ann. Sc. Nat.* sér. 4, xiv. 246.—B. H. *Gen.* 172, n. 6.

[4] Pl. et Tri. *loc. cit.* 248.

[5] Pl. et Tri. *loc. cit.* 247.

[6] Pl. et Tri. *loc. cit.* 252.—B. H. *Gen.* 172, n. 8.—H. Bn. *Bull. Soc. Linn. Par.* 77.

[7] Pl. et Tri. *loc. cit.* 249.

[8] B. H. *Gen.* 172, n. 6 ("*Œdematopode* separated from *Havetiopsis* by characters apparently of less importance").—See H. Bn. *Bull. Soc. Linn. Par.* 78.

filaments are free to a much larger extent, sometimes even nearly to the base. Their number may rise to eight or twelve and perhaps even more.[1] In conclusion, the genus *Quapoya*, thus limited,[2] is developed almost parallel to the genus *Clusia*, in which we have seen variations of the andrœcium still more numerous, both as to the number of stamens and the form of the anthers. It comprises some fifteen species,[3] belonging entirely to tropical America; the habit and organs of vegetation are those of *Clusia*, but the flowers are ordinarily much smaller.

Havetia [4] has diœcious flowers, and the leaves are nearly the same as those of the preceding genera. The ovary, surrounded by an hypogynous disk,[5] has generally in each of its four cells two [6] descending ovules, with micropyle interior and superior, and raphe ventral and sublateral.[7] But the male flowers, ordinarily tetramerous, with four imbricate petals, are remarkable for the andrœcium, composed of four large alternipetalous stamens; each of which has the form of a thick quarter of a sphere, and bears above and without three circular and valvicide cells. The only species of *Havetia* [8] known is a Columbian tree having otherwise the foliage, habit, and inflorescence of *Quapoya*.

Beside the preceding genera under the name *Clusiella* [9] has been placed, not without some doubt, a Columbian shrub having pentamerous diœcious flowers. In the females, alone known, there are contorted petals, and an ovary with five multiovulate cells, surrounded at the base by a cupule formed of a large number of sterile stamens, short and closely united. The flowers, small and collected in short cymes (?), are accompanied by from two to four pairs of imbricate and decussate bracts. Only one species is known.[1]

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[1] To 20 in the sect. *Hemiquapoya* (Pl. et Tri. *loc. cit.* 288), and if, as the same authors suppose, *Arrudea ? bicolor* Benth. belongs to this genus, it would be the richest representative in stamens since the latter number about forty.

[2] Sect. 6: 1. *Euquapoya* (*Rengifa*); 2. *Havetiopsis*; 3. *Œdematopus*; 4. *Balboa*; 5. *Renggeria*; 6. *Hemiquapoya*.

[3] Mart. *Nov. Gen. et Sp.* iii. 166. t. 297, f. iii. (*Havetia*).—Benth. *Hook. Lond. Journ.* ii. 369 (*Havetia*), *Kew Gard. Misc.* iii. 146 (*Arrudea* ?). —Pœpp. et Endl. *Nov. Gen. et Sp.* iii. 11, t. 209 A (*Havetia*).—Walp. *Rep.* i. 493 (*Rengifa*); ii. 810 (*Havetia*); *Ann.* vii. 343 (*Rengifa*), 344 (*Havetiopsis*, *Œdematopus*), 345 (*Balboa*).

[4] H. B. K. *Nov. Gen. et Sp.* v. 203, t. 462.—Spach, *Suit. à Buffon*, v. 305.—Endl. *Gen.* n. 5435.—Tri. et Pl. *Ann. Sc. Nat.* sér. 4, xiv. 245.—B. H. *Gen.* 171, n. 4.—H. Bn. *Payer Fam. Nat.* 270.

[5] It has been supposed to be formed by the union of four staminodes in a sort of cupule.

[6] It may, it is said, have four, then two inferior ascending (B. H.).

[7] The raphe becomes dorsal or nearly so at adult age in *Pilosperma* (Pl. et Tri. *Ann. Sc. Nat.* sér. 4, xiv. 243.—B. H. *Gen.* 171, n. 4), a Columbian tree which has the characters of vegetation of *Havetia*, and of which the tetramerous female flowers only are known; but we know not if the raphe may not primarily be equally ventral. Is the uril (?) of the seed, as supposed, distinct in origin from that of *Havetia ?*

[8] *H. laurifolia* H. B. K. *loc. cit.* (not *alior.*).

[9] Pl. et Tri. *Ann. Sc. Nat.* sér. 4, xiv. 253.—B. H. *Gen.* 172, n. 7.

In the two American genera *Chrysochlamys* and *Tovomita*, the ovarian cells are uniovulate, and the ascending ovule has its micropyle directed downwards and outwards. *Chrysochlamys*[2] has four or five sepals and from four to ten imbricate petals. The stamens are numerous, sometimes partly sterile, and free or united at the lower part of their short filaments. The fruit, at first somewhat fleshy, finally becomes a septicidal capsule with five valves. The seeds are surrounded by an incomplete fleshy aril, open at the back and of which the point of origin is variable.[3] Some fifteen species[4] have been described. *Tovomita*,[5] abundant especially in the Antilles, Guyana, and Brazil, has nearly the same perianth, with 4–10 petals. The stamens are free and have an erect, linear-subulate filament, surmounted by a very small anther. The ovary, with four or five cells, is surmounted by an equal number of distinct stigmatiferous heads, nearly sessile or supported each by a moderately long stylary column. The dehiscent fruit contains seeds described as destitute of aril, but in reality the entire superficial coat is transformed into arillar tissue. *Tovomita*, of which some score of species[6] have been distinguished, has, like *Chrysochlamys*, the foliage of *Clusia*, with numerous and generally small flowers, collected in umbelliform cymes, solitary or gathered in a common ramified cluster.[7]

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[1] *C. elegans*, Pl. et Tri. *loc. cit.* 254.

[2] Pœpp. et Endl. *Nov. Gen. et Sp.* iii. 13, t. 211.—Endl. *Gen.* n. 6433 [1].—Pl. et Tri. *loc. cit.* xiv. 255.—B. H. *Gen.* 172, n. 9.

[3] The g. *Tovomitopsis* (Pl. et Tri. *loc. cit.* xiv. 261;—*Bertolonia* Spreng. *N. Entd.* ii. 110, t. 1, fig. 1, not Mart.) has been distinguished on account of its aril springing from the micropyle instead of from the hilum. Bentham and Hooker say: "Nos tamen in *Chrysochlamide* arilli basin vidimus cum endocarpio et hilo seminis tam arcte concretam ut funiculus nullus appareat, et arillus cicatricis endocarpii v. seminis oriri videatur," and they join *Tovomitopsis* to the g. *Chrysochlamis*, to which they are inclined likewise to refer *Commirhea* Miers (*Trans. Linn. Soc.* xxi. 252, t. 26).

[4] A. S.-H. *Fl. Bras. Mer.* i. 315, t. 64 (*Tovomita*).—Presl. *Symb.* ii. 20, t. 66 (*Tovomita*).—Walp. *Ann.* vii. 345, 346 (*Tovomitopsis*).

[5] Aubl. *Guian.* 956, t. 364.—J. *Gen.* 256.—Poir. *Dict.* vii. 717; Suppl. v. 327.—Endl. *Gen.* n. 5433.—Pl. et Tri. *loc. cit.* xiv. 267.—B. H. *Gen.* 173, n. 10.—H. Bn. *Payer Fam. Nat.* 270.—*Marialva* Vandell. *Rœm. Scr.* 118.—DC. *Prodr.* i. 560.—*Beauharnoisia* R. et Pav. *Ann. Mus.* xi. 71, t. 9.—*Micranthera* Chois. *Mém. Soc. Hist. Nat. Par.* i. 224, t. 11, 12; DC. *Prodr.* i. 560.

[6] Mart. *Nov. Gen. et Sp.* ii. 83, t. 167 (*Marialvæa*).—Pœpp. et Endl. *Nov. Gen. et Sp.* iii. 13, t. 212 (*Marialvæa*).—Chois. *Gutt. Ind.* 34 (*Garcinia*).—Benth. *Hook. Lond. Journ.* ii. 366.—Griseb. *Fl. Brit. W.-Ind.* 106.—Walp. *Rep.* i. 392; ii. 810; *Ann.* ii. 190; vii. 346.

[7] We do not know to what group of this family to refer the abnormal genus *Allanblackia* (Oliv. *B. H. Gen.* 980, n. 15 *a*; *Fl. Trop. Afr.* i. 162), represented by a single species (*A. floribunda*), which has the external characters of a *Clusia* or a *Tovomita*, but the stamens of which are pentadelphous, with oppositipetalous bundles, rudimentary in the female flower, and the gynæcium, rudimentary in the male, has a unilocular ovary, with five parietal little-prominent and multiovulate placentæ. The inflorescence is in terminal compound clusters.

II. SYMPHONIA SERIES.

One of the two plants made known by AUBLET[1] under the name *Moronobea coccinea*, has more recently received that of *Symphonia*[2] *globulifera*. Its flowers are regular, ordinarily hermaphrodite,[3] with a concave receptacle. The calyx is formed of five sepals, arranged in the bud in quincuncial prefloration, unequal,[4] and the corolla of five alternate petals, contorted in prefloration.[5] Within the corolla

Symphonia (*Chrysopia*) *fasciculata.*

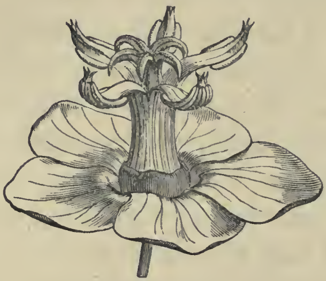
Fig. 367. Flower.

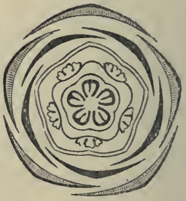
Fig. 368. Diagram.

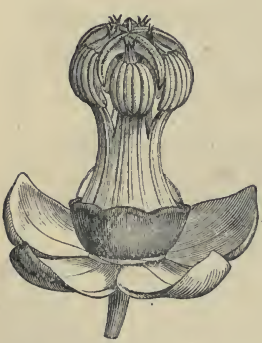
Fig. 369. Flower, without corolla.

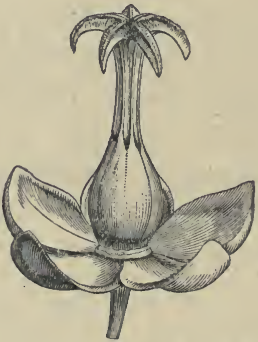
Fig. 371. Flower, corolla and andrœcium removed.

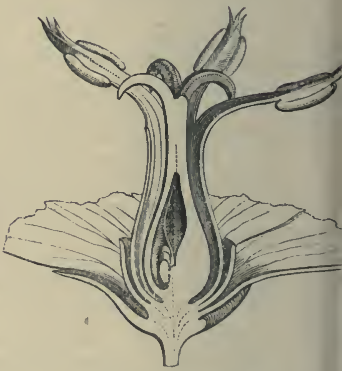
Fig. 370. Long. sect. of flower.

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[1] *Guian.* t. 113, fig. *a–j* (excl.).

[2] L. F. *Suppl.* 49, 303.—PL. et TRI. *Ann. Sc. Nat.* sér. 4, xiv. 286.—B. H. *Gen.* 173, n. 11.—H. BN. *Payer Fam. Nat.* 272.—? *Blackstonia* SCOP. *Introd.* n. 1256.—*Aneuriscus* PRESL. *Symb.* i. 72, t. 48.

[3] Perhaps polygamous.

[4] Shorter and thicker as they are exterior in the bud.

[5] As a whole nearly globular in the bud.

is a thick coriaceous cupuliform disk, within which is inserted the andrœcium. The latter is monadelphous at the base, and the filaments, united below in a sort of tube, separate higher up into five small oppositipetalous bands, the exterior face of which bears three adnate extrorse anthers, dehiscing by two longitudinal clefts, and the summit terminates in a point, at first inflexed. The gynæcium is superior, formed of an ovary with five incomplete alternipetalous cells, surmounted by a style with five open then recurved stigmatiferous branches terminated by a point at the top of which is a small aperture leading to a narrow stigmatic cavity. In the internal angle of each cell is a placenta bearing from two to six, rarely more, ascending anatropous ovules, with the micropyle inferior and exterior. The fruit is an ovoid or globular berry, with few seeds enclosing under their coats a large fleshy undivided embryo, without albumen.

S. globulifera[1] is a tree with a yellowish latex, opposite, coriaceous, entire, penninerved leaves, with numerous thin parallel and close secondary nervures. The flowers[2] are in umbelliform cymes at the top of the branches. It inhabits tropical America from the Antilles to Peru and central Brazil. It is found in western tropical Africa.[3] *Chrysopia*[4] (fig. 367–371) from Madagascar has rightly been considered congeneric with this plant, having the same organs of vegetation and the same flowers, with sometimes four anthers in each fascicle of the andrœcium and a disk more or less deeply crenelate.[5] Hitherto five species[6] of *Chrysopia* have been described.

Close beside *Symphonia* are ranged four genera, some of which are scarcely distinct and perhaps will hereafter be retained only as sections of the first. There is first the true *Moronobea*,[7] the corolla of which is more elongate and ovoid in the bud than that of *Symphonia*, and the disk exterior or rather inferior to the andrœcium disappears almost entirely at the level of the fascicles of the latter, and is seen, in the form of salient lobes, only in the intervals. Each fascicle is composed of from four to six stamens which are united only in the lower part of their filaments and free in their antheriferous part, slender, very elongate, spirally twisted in the bud. One or two species of *Moronobea* have been described, from Guyana and northern Brazil; they have opposite leaves and large terminal and solitary flowers.[1] *Montrouzeria*[2] is scarcely distinct from *Moronobea* and *Symphonea.* It has the spherical bud of the latter, the fundamentally distinct staminal fascicles of the former, with free anthers and independent glands, generally alternate[3] with the staminal bundles. The ovules are numerous and the organs of vegetation nearly those of *Moronobea.* Four or five New Caledonian species[4] are already known. *Pentadesma butyracea,*[5] one of the Butter-trees of tropical western Africa, has nearly all the characters of *Moronobea,*[6] sepals more unequal[7] and stamens more numerous in each of the five fascicles, with anthers that do not descend so low in each fascicle. The disk is the same, and the fleshy fruit, rich in fatty matter, encloses only a single seed in each cell. It is a fine tree with opposite coriaceous penninerved leaves and large solitary terminal flowers. It is nearly allied to *Platonia,*[8] a large tree of tropical eastern America, having the bud of *Moronobea,* a disk with lobes alternating with the staminal fascicles, but in each of the latter a very large number of slender, straight filaments, which soon separate from each other and bear each a linear and extrorse anther[9] proceeding from the middle of its length. Two[10] species of *Platonia* are described, trees whose organs of vegetation are those of *Symphonia* and its beautiful flowers[1] solitary and terminal.[2]

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[1] *Moronobea globulifera* SCHLCHTL, *Linnæa*, viii. 189.—*Aneuriscus exscrens* PRESL.—*A. Aubletii* PRESL.

[2] Red, very odorous.

[3] OLIV. *Fl. Trop. Afr.* i. 163. It is a question if it has not been introduced.

NORONH. ex DUP.-TH. *Gen. Nov. Mad.* 14.—DC. *Prodr.* i. 563.—SPACH, *Suit. à Buffon*, v. 319.—CAMBESS. *Mém. Mus.* xvi. 422, t. 19.—ENDL. *Gen.* n. 5440.—PL. et TRI. *Ann. Sc. Nat.* sér. 5, xiv. 289.

[5] In *C. gymnoclada* the ovary is described as directly surmounted by five punctiform stigmata (PL. et TRI.).

[6] One of them, *C. urophylla* DCNE. is perhaps evidently a form little distinct from *Symphonia globulifera* L. F.

[7] AUBL. *Guian.* 788, t. 313 (excl. fig. *a–j*).—ENDL. *Gen.* n. 5441 (part).—PL. et TRI. *Ann. Sc. Nat.* sér. 4, xiv. 295.—B. H. *Gen.* 174, n. 13.—*Leuconocarpus* SPRUCE, herb. (ex. PL. et TRI.).

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[1] White.

[2] PANCH. ex PL. et TRI. *Ann. Sc. Nat.* sér. 4, xiv. 292.—B. H. *Gen.* 173, n. 12.

[3] In *M. cauliflora* the disk, little prominent, is quite entire beneath the stamens, and does not project into the intervals of the filaments.

[4] PANCH. *Séb. Not. Bois N.-Caled.* 220.—H. BN. *Adansonia,* xi. 366.

[5] SAB. *Trans. Hort. Soc.* v. 457.—DON, *Gen. Syst.* i. 619.—SPACH, *Suit. à Buffon,* v. 320.—ENDL. *Gen.* n. 5415.—PL. et TRI. *Ann. Sc. Nat.* sér. 4, xiv. 300.—B. H. *Gen.* 174, n. 15.—OLIV. *Fl. Trop. Afr.* i. 164.

From which it cannot be retained as generically distinct.

[7] From which the sepals are said to pass imperceptibly to petals.

[8] MART. *Nov. Gen. et Sp.* iii. 108, t. 288, f. 2, t. 289.—ENDL. *Gen.* n. 5456.—PL. et TRI. *Ann. Sc. Nat.* sér. 4, xiv. 297.—B. H. *Gen.* 174, n. 14. —H. BN. *Payer Fam. Nat.* 272.

[9] The pollen is "spherical with four rather short folds, and four transverse elliptical umbilics." (H. MOHL. *Ann. Sc. Nat.* sér. 2, iii. 329.)

[10] ARRUD. *Discors.* 32 (*Bacury*). — ABBEV. *Miss. Capuc.* 222 (*Pacoury*).

III. GARCINIA SERIES.

Garcinia has polygamo-diœcious flowers. In some of them, distinguished under the name of *Xanthochymus*[3] (fig. 372–375), they are pentamerous, and on their convex receptacle are inserted, from bottom to top, five sepals imbricate in the bud, more or less unequal,[4] and five alternate imbricate petals.[5] In front of each petal is a bundle of stamens in which the male organs are few in number, often, for example, from four to six. The filaments are often united to a considerable extent, after which they become distinct and support each a bilocular introrse anther, dehiscing by two longitudinal clefts, often sterile or even disappearing in the female flowers. With these five staminal bundles alternate an equal number of hypogynous glands or lobes of a disk more or less rugose or plaited, surmounted by a gynæcium, imperfect or nil in the male flowers. In the female or hermaphrodite, it is composed of a free ovary, with five alternipetalous cells, surmounted by a style discoid dilated stigmatiferous at its extremity, with five obtuse or very prominent and radiating

Garcinia Xanthochymus.

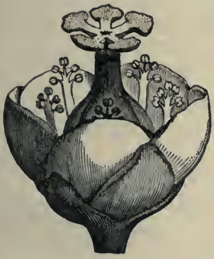
Fig. 372 Flower (☿).

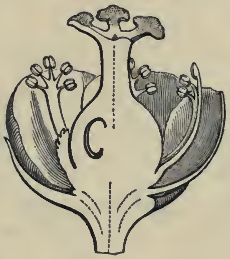
Fig. 373. Long. sect. of flower.

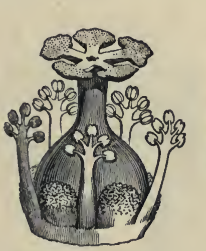
Fig. 374. Andrœcium and gynæcium.

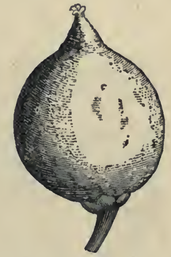
Fig. 375. Young fruit.

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[1] Large pink.

[2] Like all the types of this series, this will perhaps one day be regarded as simply a section of a single genus.

[3] Roxb. *Pl. Coromand.* ii. 51, t. 196; iii. t. 270. —Chois. DC. *Prodr.* i. 562; *Gutt. Ind.* 23, 32. Endl. *Gen.* n. 5444.—Pl. et Tri. *Ann. Sc. Nat.* sér. 4, xiv. 303.—B. H. *Gen.* 175, n. 17.—H. Bn. *Payer Fam. Nat.* 270.—*Stalagmites* Murr. *Comm. Gœtt.* ix. 173 (part).—DC. *Prodr.* i. 562.

[4] The most exterior are the smallest.

[5] Or more rarely contorted.

lobes (fig. 372–374). The two lateral cells and the corresponding stylary branches may be wanting. In the internal angle of each cell is an axile placenta supporting a single ascending incompletely anatropous ovule, with micropyle inferior and exterior. The fruit is a berry. The seeds, surrounded by a fleshy pulp,[1] enclose under their coats a large fleshy and undivided embryo.

In the true *Garcinia*[2] the flowers are generally tetramerous (fig. 354, 376–378). The sepals are imbricate-decussate and the two exterior are not unfrequently[3] much smaller than the others. The stamens are generally arranged like those of *Xanthochymus*, either free or united in five fascicles or sometimes more, with anthers fertile only in the male or hermaphrodite flowers. The organization and mode of dehiscence of these anthers are very variable. In *G. Mangostana* and analogous species,[4] they are bilocular. In the species of the *Cambogia* series, they have two cells or four cellules, equally dehiscing by clefts. In *G. Morella*[5] (fig. 354, 378), they are peltate and open by a sort of small lid like a pyxis.[6] The gynæcium is composed of a very variable number of carpels (from two to a dozen). The ovary encloses, in the internal angle of each

Garcinia Mangostana.

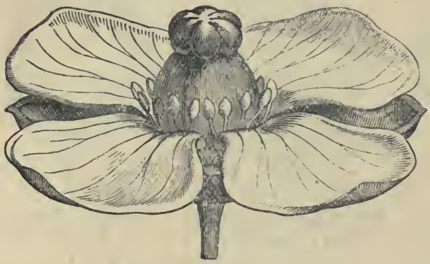

Fig. 376. Female flower.

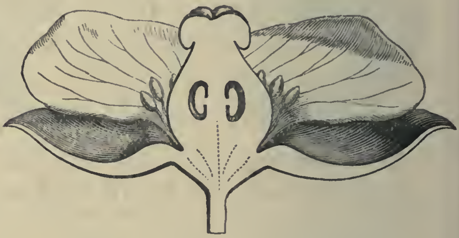

Fig. 377. Long. sect. of female flower.

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[1] Seminal coats transformed.

[2] L. *Gen.* n. 594.—J. *Gen.* 256.—Desrx. *Lamk. Dict.* iii. 699; Suppl. iii. 584; *Ill.* t. 405.—DC. *Prodr.* i. 560.—Cambess. *Mém. Mus.* xvi. 425.—Spach, *Suit. à Buffon*, v. 322.—Endl. *Gen.* n. 5443.—Pl. et Tri. *Ann. Sc. Nat.* sér. 4, xiv. 324.—B. H. *Gen.* 174, 980, n. 16.—H. Bn. *Payer Fam. Nat.* 271.—Laness. *Adansonia*, x. 283. t. 11.—*Cambogia* L. *Gen.* n. 650.—*Mangostana* Gærtn. *Fruct.* ii. 105, t. 105.—*Oxycarpus* Lour. *Fl. Cochinch.* (ed. 1790) 647.—*Brindonia* Dup.-Th. *Dict. Sc. Nat.* v. 339.—*Rhinostigma* Miq. *Fl. Ind.-Bat.* Suppl. i. 495.—*Clusianthemum* Vieill. *Bull. Soc. Linn. Norm.* ix. 338.

[3] Particularly in the greater part of the species from tropical western Africa, which thus differ from *Rheedia* only in the presence of more than two sepals to the calyx.

[4] Sect. *Mangostana* (Bl.—Pl. et Tri.).

[5] Type of the sect. *Hebradendron*, formerly raised to the rank of a genus (Graham, *Hook. Kew Journ.* vi. 70, t. 2 C).

[6] The anthers are linear, 2-locular, in *Clusianthemum*; which has 4–5-merous flowers, and

cell, an ovule like that of *Xanthochymus*, and is surmounted by a style, dilated to a head of very variable form, with lobes more or less salient and distinct.[1] Often the entire style exists in the centre of the male flowers, but without ovary; in other cases the gynæcium disappears entirely. The fruit is analogous to that of *Xanthochymus*; it is a berry, often corticate, furnished at the base with the calyx and at the summit with the persistent style. The seeds, with pulpy coat, enclose an embryo undivided or with macropod radicle, surmounted by two very small cotyledons.[2]

Garcinia Morella.

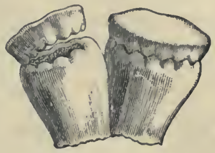

Fig. 378. Stamens.

Under the name of *Discostigma*,[3] have been distinguished generically some species of *Garcinia* with small flowers in false umbels in the axils of the leaves and anthers opening by short clefts resembling pores; and under the name of *Terpnophyllum*,[4] some *Discostigma* of Ceylon whose stamens are slightly adherent with the base of the sepals.

Thus understood,[5] the genus *Garcinia* is composed of about forty species[6] belonging to all the tropical regions of the old world. They are trees or shrubs with a yellow juice, thick opposite coriaceous penninerved leaves, nearly always entire, without stipules. The flowers are terminal or axillary, solitary, or in triflorous or more or less ramified cymes resembling compound clusters or umbels.

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the stamens are inserted on a quadrilateral receptacular projection. (See H. Bn. *Adansonia* xi. 379.)

[1] There are some sections founded on the character of the stigma which is peltate in *Peltostigma* and *Trachycarpus*, with tubercular lobes in *Comarostigma*.

[2] In germination, the gemmule is elongate, and its appendages separate from each other. Adventitious roots, variable in number, may then be developed at the base, and these alone will soon nourish the young plant. At the opposite extremity of the embryo there is also (as in certain Monocotyledons) a thin root soon arrested in its development. Roxburgh, then Planchon et Triana (*Ann. Sc. Nat.* sér. 4, xvi. 302), consider it an original root of transitory existence.

[3] Hassk. *Cat. Hort. Bogor.* 212.—Endl. *Gen.* Suppl. iii. 95.—Chois. *Mém. Soc. Gen.* (1860) xv. 435.—Pl. et Tri. *Ann. Sc. Nat.* sér. 4, xiv. 361.

[4] Thw. *Hook. Kew Journ.* 70, t. 2 C.—Pl. et Tri. *loc. cit.* 363.

[5] Sect. 12: 1. *Hebradendron* (Grah.); 2. *Mangostana* (Gærtn.); 3. *Peltostigma* (Pl. et Tri.); 4. *Xanthochymus*; 5. *Rheediopsis* (an African species mentioned above); 6. *Clusianthemum* (Vieill.); 7. (?) *Rhinostigma* (Miq.); 8. *Cambogia* (L.); 9. *Comarostigma* (Pl. et Tri.); 10. *Trachycarpus* (Pl. et Tri. *loc. cit.* 348); 11. *Discostigma* (Hassk.); 12. *Terpnophyllum* (Thw.).

[6] Wight, *Icon.* t. 44, 102–105, 112–115, 116, 120, 121, 192, 960, 960 (2); *Ill.* t. 44.—Wall. *Pl. As. Rar.* ii. t. 258.—Roxb. *Pl. Corom.* iii. t. 298.—Thw. *Enum. Pl. Zeyl.* 48, 49; Suppl. 493 (*Terpnophyllum*, *Xanthochymus*).—Seem. *Voy. Her. Bot.* t. 79, 93.—Miq. *Fl. Ind.-Bat.* i. p. i. 506; *Ann. Mus. Lugd.-Bat.* i. 208.—Oliv. *Fl. Trop. Afr.* i. 164, 168 (*Xanthochymus*).—Kurz, *Journ. As. Soc.* xxxvii. 64.—Anderson, *Hook. Fl. Brit. Ind.* i. 259.—Walp. *Rep.* i. 394, 395 (*Xanthochymus*), 811; *Ann.* ii. 190; iv. 365, 366 (*Discostigma*); vii. 350, 353 (*Discostigma*), 354 (*Terpnophyllum*).

Rheedia is scarcely distinct from tetramerous *Garcinia*; it differs only in this; that the calyx, instead of being in two dimerous verticils, with alternate pieces, has only two free imbricate sepals, rarely united to any considerable extent. It comprises trees of tropical America, whose organs of vegetation are those of *Garcinia*. Two from Madagascar and one from tropical western Africa are all the species that have been described. *Ochrocarpus* is also a near neighbour of *Garcinia*, and between it and *Rheedia* the only difference observable is that the calyx, represented in the bud by a valvate and close sac, afterwards divides from top to bottom into two equal or unequal parts. It has been found in Madagascar, in tropical western Africa, and in eastern India. All these plants have the same embryo as *Garcinia*.

IV. MAMMEA SERIES.

Mammea[1] (fig. 379), having the flowers of *Ochrocarpus*, would be placed in the same series if it had not an embryo of quite a different organization; a character to which, in this family, a great value has been attached in classification. Instead of being macropod and undivided, this embryo is in fact composed of a very short inferior radicle and of two very large plano-convex cotyledons, united to each by their internal surface. The polygamous flowers, moreover, have a valvate calyx, divided at the period of anthesis into two valves, of from four to eight imbricate petals, numerous stamens, with erect elongate

Mammea americana.

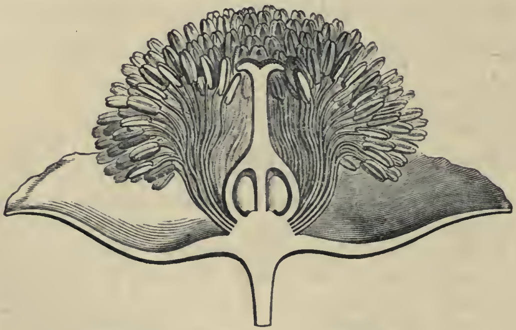

Fig. 379. Long. sect. of flower ($\frac{2}{1}$).

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[1] L. *Gen.* n. 656.—J. *Gen.* 257.—Lamk. *Ill.* t. 458.—Desrx. *Dict.* iii. 692; Suppl. iii. 582 (part).—DC. *Prodr.* i. 561.—Cambess. *Mém. Mus.* xvi. 424.—Turp. *Dict. Sc. Nat.* Atl. t. 157. —Spach, *Suit. à Buffon*, v. 321.—Endl. *Gen.* n. 5442.—B. H. *Gen.* 176, n. 23 (part), 981.—H. Bn. *Payer Fam. Nat.* 271.—Pl. et Tri. *Ann. Sc. Nat.* sér. 4, xv. 240 (part).

anthers, dehiscing by two longitudinal clefts and a gynæcium destitute of disk. The ovary is bilocular, surmounted by a style with stigmatiferous extremity dilated to a large subpeltate and bilobed head. In the internal angle of each of the cells are two nearly basilar collateral ascending ovules, with micropyle exterior and inferior. The fruit is a large corticate 1–4-spermous berry.[1] There is perhaps only one species[2] of *Mammea*,[3] a native of tropical America, but introduced and cultivated in several warm countries of Asia and Africa. The leaves are opposite, rigid, coriaceous, entire, penninerved, with numerous fine parallel secondary nervures, covered with glandular punctuations. The flowers are axillary, solitary or united in pauciflorous cymes and with pedicels ordinarily short.

Mesua ferrea.

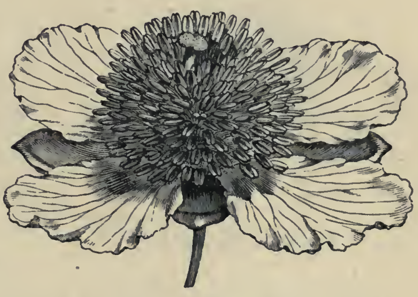

Fig. 380. Flower.

Close beside *Mammea* are placed three genera from tropical Asia, which scarcely differ from it in the fundamental organization of the flower; these are *Mesua*, *Kayea*, and *Pœciloneuron*. *Mesua* (fig. 380) has hermaphrodite, tetramerous flowers, with imbricate sepals, an ovary with two biovulate cells and a style longer than that of *Mammea*, but terminated also by a large stigmatiferous bilobed head. The fruit finally opens in four valves. Four or five species[5] are described. *Kayea*[6] has the same flowers, with four unequal, imbricate-decussate sepals, exserted stamens, with small and nearly globular anthers. The ovary has a single cell, with four ovules, rarely more, inserted quite at the base, and it is surmounted by a long subulate style, divided at the summit into four small pointed lobes. The fruit is indehiscent. Seven or eight species[1] are known. *Pœciloneuron*,[2] primarily referred to the family of the *Ternstrœmiaceæ*, has nearly the flowers of *Mesua*, with two biovulate cells in the ovary, two subulate styles, with stigmatiferous punctiform extremity, and a capsular septicidal (?) and monospermous fruit. Two species[3] are distinguished, from the Indian peninsula.

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[1] The seeds are ascending, nearly erect, large, covered with a thick bed resembling fibrous hemp, enclosing a large fleshy embryo quite riddled with reservoirs of gum-resinous juice, and much resembling a large almond, with plano-convex cotyledons, well defined externally, but united by their plane surface, and a very short inferior radicle.

[2] *M. americana* L. *Spec.* (ed. 1), 512.—Jacq. *Amer.* 268, t. 181, fig. 82; *Amer. Pict.* t. 248.—Vahl, *Ecl.* ii. 40.—W. *Spec.* ii. 1157.—*Mamay* Bauh. *Hist.* i. 172.—*Mammei magno fructu, Persicæ sapore* Plum. *Gen.* 44; *Ic.* 170.—*Rheedia americana* Griseb. *Fl. Brit. W.-Ind.* 108.

[3] The other species admitted into the genus by Triana and Planchon (*loc. cit.* 244–246) are attributed by Oliver to the genus *Ochrocarpus* (see p. 408, 426).

[4] L. *Gen.* n. 656.—J. *Gen.* 258.—DC. *Prodr.* i. 562.—Cambess. *Mém. Mus.* xvi. 426, t. 17, fig. 6.—Spach, *Suit. à Buffon*, v. 272.—Endl. *Gen.* n. 5447.—B. H. *Gen.* 176, 981, n. 22.—H. Bn. *Payer Fam. Nat.* 272.—Pl. et Tri. *Ann. Sc. Nat.* sér. 4, xv. 298.—*Rhyma* Scop. *Introd.* n. 1185 (ex Endl.).

[5] Rumph. *Herb. Amboin.* vii. 3, t. 2 (*Nagassarium*).—Rheede, *Hort. Malab.* iii. t. 35.—Herm. *Zeyl.* 7 (*Naghas*).—Chois. *Gutt. Ind.* 40.—Wight, *Icon.* t. 117–119, 961.—Thw. *Enum. Pl. Zeyl.* 50.—Miq. *Fl. Ind.-Bat.* i. p. ii. 509.—Hook. f. *Fl. Brit. Ind.* i. 277.—Walp. *Rep.* i. 396; *Ann.* i. 129; vii. 358.

[6] Wall. *Pl. As. Rar.* iii. 5, t. 210.—Endl. *Gen.* n. 5449.—B. H. *Gen.* 176, n. 21.—Pl. et Tri. *Ann. Sc. Nat.* sér. 4, xv. 295.

Calophyllum Calaba.

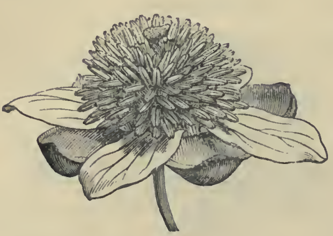

Fig. 381. Flower ($\frac{2}{1}$).

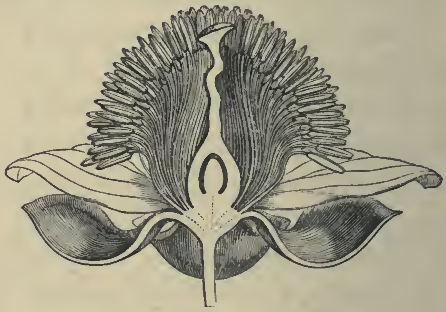

Fig. 382. Long. sect. of flower ($\frac{3}{1}$).

Calophyllum[4] (fig. 381–384), of which a separate group has been made, is exceptional in this series by a single character; the gynæcium is reduced to one carpel, and the ovary, consequently, has but one cell with a single anatropous, almost basilar ovule, ordinarily ascending,[5] and the style is terminated by a more or less oblique stigmatiferous head. The fruit is a drupe the seed of which encloses an embryo similar in construction to that of *Mammea*, with a very short inferior radicle. The imbricate sepals number from two to four, and the petals (which may be wanting?) vary from two to ten.[1] About forty species[2] of *Calophyllum* are admitted. They are trees with smooth opposite coriaceous leaves with numerous fine close parallel penniform secondary nervures, and flowers in clusters of terminal or axillary and more or less ramified cymes. They inhabit all the tropical regions of America, Asia, Oceania, and Africa.

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[1] Thw. *Enum. Pl. Zeyl.* 50.—H. Bn. *Adansonia*, xi. 368.

[2] See vol. iv. p. 269. This genus, unknown to us, had previously been referred doubtfully to the *Ternstrœmiaceæ*.

[3] Bedd. *Fl. Sylv.* t. 3, 93.—T. Dyer *Hook. f. Fl. Brit. Ind.* i. 278.

[4] L. *Gen.* n. 658.—J. *Gen.* 258; *Ann. Mus.* xx. 466.—Lamk. *Dict.* l. 552; Suppl. ii. 17; *Ill.* t. 459.—Gærtn. *Fruct.* i. 201, t. 43, fig. 1.—DC. *Prodr.* i. 562.—Cambess. *Mém. Mus.* xvi. 427, t. 17, fig. C.—Spach, *Suit à Buffon*, v. 330.—Endl. *Gen.* n. 5448.—Payer, *Fam. Nat.* 40.—B. H. *Gen.* 175, n. 20.—Pl. et Tri. *Ann. Sc. Nat.* sér. 4, xv. 247.—*Calaba* Plum. *Gen.* 39, t. 18.—Adans. *Fam. des Pl.* ii. 446.—*Inophyllum* Burm. *Thes. Zeyl.* 130.—*Kalophyllodendron* Vaill. *Mém. Acad. Par.* [1722] 207.—*Balsamaria* Lour. *Fl. Cochinch.* (ed. 1790) 469.—*Apoterium* Bl. *Bijdr.* 218.—*Lamprophyllum* Miers, *Trans. Linn. Soc.* xxi. 249, t. 26, fig. 13 (part).

[5] Owing to the slight variations presented by the point of insertion and to its anatropy more or less complete, this ovule may here and there direct its micropyle towards the side or even towards the top of the cell; as we have seen in certain fresh flowers of the cultivated plant.

Calophyllum Calaba.

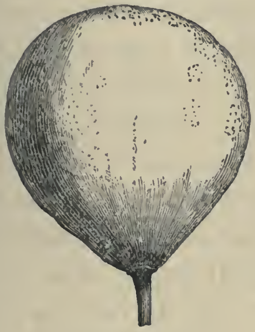

Fig. 383. Fruit.

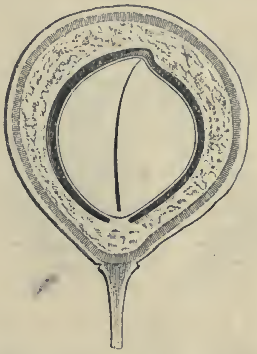

Fig. 384. Long. sect. of fruit.

V. QUIINA SERIES.

The flowers of *Quiina*[3] (fig. 385) are polygamous, with a small convex receptacle bearing at first four decussate or five imbricate sepals. The petals, alternate and equal in number, or rising to seven or eight, are free or slightly united at the base and imbricate in the bud. The stamens are numerous in the male flowers, where they consist of a slender filament and a short subglobose anther of two[4] cells dehiscing internally or near the margin by longitudinal clefts. They are inserted on the receptacle or, more rarely, are united to a small extent with the base of the corolla and fall with it. In the female flowers, the stamens less numerous, are often grouped in alternipetalous bundles, and the anthers may present the ordinary appearance without being fertile.[1] The gynæcium, of which there is rarely a rudiment in the male flowers, is composed of a free ovary, with two or three cells, surmounted by a style immediately divided into an equal number of slender subulate branches enlarged at the summit to a discoid or reniform stigmatiferous head. In the internal angle of each cell are inserted, near the base, two collateral ascending ovules, with the micropyle exterior and inferior. The fruit is a slightly fleshy berry, finally dehiscent, ordinarily monospermous, more rarely with two seeds which enclose, under their coats,[2] a fleshy often spherical embryo, with short inferior radicle and thick hemispherical cotyledons. *Quiina* consists of trees or shrubs, sometimes climbing, with a clear juice[3] less abundant than in the rest of the family, opposite, verticillate leaves, most frequently accompanied by two narrow rigid lateral stipules. They are ordinarily simple, dentate or crenelate, with pennate nervures connected by fine transverse veins. In *Touroulia*,[4] which probably ought to be united with this genus, the leaves are pinnatipartite. The flowers[5] of *Quiina* are small, generally numerous, united in more or less ramified clusters of cymes often biparous. About fifteen species[6] are known, natives of tropical America and nearly all of Guyana.

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[1] On these characters are founded the sections admitted in this genus particularly by Thwaites.

[2] Rumph. *Herb. Amboin.* ii. t. 71, 72 (*Bintangor*).—Jacq. *Amer.* t. 165.—A. S.-H. *Fl. Bras. Mer.* i. 320, t. 57.—Wight and Arn. *Prodr.* i. 102.—Wight, *Hook. Bot. Misc.* Suppl. t. 17; *Icon.* t. 106–108, 110, 111.—Thw. *Enum. Pl. Zeyl.* 51, 407.—Griseb. *Fl. Brit. W.-Ind.* 108.—Miq. *Fl. Ind.-Bat.* i. p. ii. 509; Suppl. 193, 497.—Hook. f. *Fl. Brit. Ind.* i. 271.—Benth. *Fl. Austral.* i. 183.—Walp. *Rep.* i. 396; ii. 811; *Ann.* i. 129; ii. 191; iv. 366; vii. 356.

[3] Aubl. *Guian.* Suppl. 19, t. 379.—Poir. *Dict.* vi. 34 (*Quina*).—Tul. *Ann. Sc. Nat.* sér. 3, xi. 156.—B. H. *Gen.* 176, 981, n. 24.—Pl. et Tri. *Ann. Sc. Nat.* sér. 4, xv. 309.—*Guiina* Crueg. *Linnæa*, xx. 115.

[4] Sometimes only one.

Quiina florida.

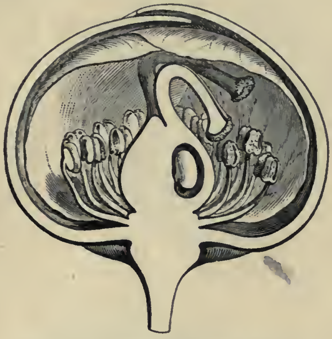

Fig. 385. Long. sect. of bud ($\frac{5}{1}$).

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[1] Exceptionally, however, they enclose grains of pollen.

[2] The exterior is tomentose.

[3] Of a gummy nature (Trécul), see p. 415.

[4] Aubl. *Guian.* i. 492, t. 194.—J. *Gen.* 434.—Poir. *Dict.* vii. 718; *Ill.* t. 424.—Endl. *Gen.* n. 4565.—Pl. et Tri. *loc. cit.* 315.—*Robinsonia* Schreb. *Gen.* n. 852.

[5] White or yellowish, odorous.

[6] Griseb. *Fl. Brit. W.-Ind.* 105.—Walp. *Rep.* ii. 434; *Ann.* vii. 359.

In 1789 A.-L. DE JUSSIEU[1] established the family of *Guttiferæ*, which he placed between the St. John's Worts and Oranges. Beside the new genera *Clusia*, *Garcinia*, *Tovomita*, *Quapoya*, *Moronobea*, *Mammea*, *Mesua*, *Rheedia*, and *Calophyllum*, which belong to it, he placed seven foreign types, viz.: *Grias* of the *Myrtaceæ*,[2] *Valeria* and *Vatica* of the *Dipterocarpeæ*, *Allophyllus* of the *Sapindaceæ* and *Elæocarpus* of the *Tiliaceæ*; and in addition the three genera of AUBLET, *Macahanea*,[3] *Macoubea*,[4] and *Singana*,[5] the place of which is still to be found, as also that of several types imperfectly known,[6] erroneously attributed to the *Clusiaceæ*. Later,[7] he further added *Venana*, now referred, under the name of *Brexia*, to the *Saxifragaceæ*. From 1822 to 1824, CHOISY,[8] who on several occasions devoted himself to the study of the *Guttiferæ*, included among them *Havetia* of KUNTH, *Ochrocarpus* of DUPETIT-THOUARS, with a certain number of *Ternstrœmiaceæ* and *Canella*. In 1828 CAMBESSEDES,[9] taking in hand the study of the genera constituting the group of *Guttiferæ*, reduced them to ten,[10] viz.: *Tovomita*, *Clusia*, *Havetia*, *Moronobea*, *Chrysopea* (*Symphonia*), *Mammea*, *Rheedia*, *Garcinia*, *Mesua*, and *Calophyllum*. By ENDLICHER[11] were added to it *Pentadesma* of DON, *Kayea* of WALLICH, and *Platonia* of MARTIUS, wrongly referred to *Canellaceæ*.[12] In 1836 LINDLEY[13] gave to the family the name of *Clusiaceæ*. Besides the types enumerated above, he placed in it *Chrysochlamys* and *Rengifa* of PŒPPIG, *Reuggeria* of MARTIUS, and *Calysaccion* of WIGHT. In 1849 CHOISY,[14] treating of the Indian *Guttiferæ*, admits the same genera, and adds *Cochlanthera*. The number of generic types is still more considerable, for it amounts to thirty-four in the most complete work on the family by PLANCHON and TRIANA[1] published in 1861 and 1862. These authors, who based the classification of the *Clusiaceæ* on the conformation of the embryo, added thereto twelve new genera, seven named by themselves: *Oxystemon*, *Polythecandra*, *Balboa*, *Œdematopus*, *Havetiopsis*, *Clusiella*, and *Pilosperma*,[2] and those previously proposed: *Arrudea* by CAMBESSEDES, *Androstylium* by MIQUEL, *Discostigma* by HASSKARL, *Montrouzeria* by PANCHER, and in addition the old genus *Touralia* of AUBLET and his *Quiina* which, some years previously, TULASNE[3] had referred to this family. In 1862 BENTHAM and HOOKER[4] reduced the number of genera to twenty-four, by referring to other types *Arrudea*, *Oxystemon*, *Androstylium*, *Cochlanthera*, *Œdematopus*, *Tovomitopsis*, *Discostigma*, and *Touralia*. After them OLIVER united *Calysaccion* to *Ochrocarpus*[5] and created the abnormal genus *Allanblackia*.[6] As *Calysaccion* had been included in *Mammea* by PLANCHON and TRIANA, the total number was then twenty-five. HOOKER[7] joined to it *Pœciloneuron*, formerly considered a *Ternstrœmiacea*.[8] By uniting *Reuggeria*, *Reugifa*, *Havetiopsis*, *Œdematopus*, and *Balboa*[9] to the true *Quapoya*, and by referring *Xanthochymus*, as a simple section,[10] to *Garcinia*, we have reduced the number of genera to be retained to twenty-two, and we have indicated the possibility of a still greater reduction by showing how little importance can be attached to the characters by which the genera of the *Symphonia* series are distinguished from each other.

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[1] *Gen.* 255, Ord. 9.

[2] See p. 376, n. 55.

[3] AUBL. *Guian.* Suppl. 6, t. 371.—J. *Gen.* 257 (*Macanea*).—PL. et TRI. *Ann. Sc. Nat.* sér. 4, xvi. 318. These authors consider this plant a *Hippocratea* (*Tontelea*). The fruit, numbered 1, 2, in the plate of AUBLET, much resembles that of a *Uvaria.*

[4] AUBL, *Guian.* Suppl. 17, t. 378.—J. *Gen.* 257. PLANCHON and TRIANA think that the fruit represented in this plant is also that of a *Tontelea.*

[5] AUBL. *Guian.* 574, t. 230. BENTHAM (*Gen.* 465) thinks that this plant belongs perhaps to *Swartzia* (*Tounatea*). ENDLICHER classed it with the *Capparideæ.*

[6] Especially *Soala* (BLANCO, *Fl. Filip.* 437), which in certain characters resembles the *Anonaceæ* and *Barringtoniæ*; *Stelechospermum* (BL. *Fl. Jav. Dipteroc.*), a genus proposed for *Vateria flexuosa* LOUR. (*Fl. Coch.* 334), a tree with alternate leaves, very different from the *Clusiaceæ.* MIERS (*Contrib.* i 114, not.) has also noted under the names of *Perissus* and *Catalissa*, two genera of *Clusiaceæ* from tropical America, of which we know only the names.

[7] *Ann. Mus.* xx. (1813).

[8] *Mém. Soc. Hist. Nat. Par.* i. p. ii.; DC. *Prodr.* i. (1824) 557, Ord. 35.

[9] *Mém. Mus.* xvi. 370, t. 17, 19.

[10] To say nothing of the synonyms which do double service.

[11] *Gen.* 1024, Ord. 216 (*Clusiaceæ*).

[12] *Loc. cit.* 1029.

[13] *Introd.* (ed. 2) 74.

[14] *Mém. Soc. Hist. Nat. Genève*, xii.

The number of species known may be estimated at two hundred and fifty; they all belong to the warm countries of the globe and scarcely if at all cross the northern tropic. In North America they are found only in the warmest parts of Mexico. Of the twenty-two genera, eleven belong to America, viz.: those of the *Clusia* series, *Moronobea* and *Platonia*, *Mammea* and *Quiina*. Three genera, *Mesua*, *Kayea*, *Pœciloneuron*, are exclusively Asiatic. *Pentadesma* and *Allanblackia* are from tropical western Africa; *Montrouzeria*, from New Caledonia. *Symphonia*, *Calophyllum*, and *Rheedia*, are common to the tropical regions of both worlds; *Garcinia* to those of the old world; *Ochrocarpus* to Asia and Africa, nearly all located in Madagascar. Only one *Calophyllum* is known in Australia.

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[1] *Bull. Soc. Bot. de Fr.* viii. 26, 66; *Ann. Sc. Nat.* sér. 4, xiii. 306; xiv. 226; xv. 240; xvi. 263.

[2] These two latter, several essential organs of which are imperfectly known, are only doubtfully admitted.

[3] *Ann. Sc. Nat.* sér. 3, xi. 156.

[4] *Gen.* 167, 980, Ord. 27.

[5] *Fl. Trop. Afr.* i. 169 (1868).

[6] *B. H. Gen.* 980 (1867).

[7] *Fl. Brit. Ind.* i. 278 (1874).

[8] See vol. iv. p. 261.

[9] *Bull. Soc. Linn. Par.* 77.

[10] Following the example of KURZ (*Journ. As. Soc. Beng.* xxxvii. 64) and J. HOOKER (*op. cit.* 259).

All the *Clusiaceæ* have common characters by which they are easily recognized in collections. All are woody, not unfrequently sarmentose, some pseudo-epiphytal,[1] frequently rich in a resinous or gummy latex, yellow or greenish.[2] The leaves are opposite, rarely verticillate, nearly always entire, thick, coriaceous, glabrous, penninerved, but with veinules generally scarcely visible. They are rarely dentate or cut, and rarely furnished with stipules.[3] In one or two *Quiina* only are they pinnatifid or pinnatisect.[4] The flowers are regular, rarely hermaphrodite (*Symphonieæ*), ordinarily polygamo-diœcious, most frequently disposed in cymes united in more or less compound inflorescences; they are white, greenish, yellow, pink or red, but never blue. The seed is destitute of albumen.

The characters which vary are: the number of floral parts, the prefloration of the calyx, the structure of the calyx, the union or separation of the sexes in the same flower, the organization of the gynæcium, the greater or less development of interlocular partitions, the number and direction of the ovules, the consistence of the pericarp which is dry or fleshy, dehiscent or indehiscent, and especially the character of the embryo which more especially distinguishes the following series:

I. CLUSIEÆ. — Flowers polygamo-diœcious. Calyx imbricate. Ovary cells 1–∞-ovulate. Style short, peltate, or in radiating divisions at the summit of the ovary, with stigmatic lobes more or less distinct. Fruit finally dehiscent. Embryo fleshy, macropod, with very small and scarcely distinct cotyledons.—8 genera.

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[1] They are nourished from the soil into which their roots are plunged; but they often twine round trees for support and finally kill them; whence the common names, Murderous bindweed, Cursed figs, Millepedes, etc.

[2] The reservoirs of these juices have been especially studied by M. TRÉCUL (*Des vaiss. propr. dans les Clusiacées, Compt. Rend. Acad. Sc.* lxiii. 537, 613; *Adansonia*, vii. 182, 194;—*Lacunes à gomme dans les Quiinées, Compt. Rend.* lxiii. 717; *Adansonia*, viii. 91), and in *Garcinia*, by DE LANESSAN (see p. 417, note 3).

[3] These organs appear to exist in certain *Quiina;* but in the other groups what is described as such is probably only a petiolate dilatation (see PL. et TRI. *Ann. Sc. Nat.* sér. 4, xvi. 268).

[4] Pinnatipartite in *Touroulia.*

II. Symphonieæ.[1]—Flowers generally hermaphrodite. Calyx imbricate. Stamens united in five oppositipetalous bundles. Ovary cells equal in number to that of the petals. Style elongate with five stigmatiferous branches. Ovules 2–∞, ascending or horizontal. Fruit fleshy, indehiscent. Embryo fleshy undivided, without cotyledons.—5 genera.

III. Garcinieæ.—Flowers polygamo-diœcious. Calyx imbricate or valvate and gamosepalous. Stamens ∞, free, 1-adelphous or in fascicles. Ovary cells uniovulate. Ovule ascending, with micropyle inferior or exterior. Fruit fleshy, indehiscent. Embryo macropod, with very large radicle and cotyledons very small or nil.—3 genera.

IV. Mammeeæ.[2]—Flowers polygamo-diœcious or hermaphrodite. Calyx imbricate or valvate and gamosepalous. Stamens ∞, free or monadelphous at base. Ovary cells 1–4, uniovulate. Style elongate, peltate, capitate or ramified at summit. Ovule ascending with micropyle inferior and exterior. Fruit fleshy seldom dehiscent. Embryo fleshy, with strict voluminous plano-convex cotyledons, free or conferruminate, and short inferior radicle.—5 genera.

V. Quiineæ.— Flowers polygamo-diœcious. Calyx imbricate. Corolla polypetalous or gamopetalous. Stamens ∞, free or nearly so. Ovary cells 2, 3, 2-ovulate. Styles slender and free. Ovules ascending, with micropyle inferior and exterior. Fruit fleshy, indehiscent. Embryo with developed free cotyledons and short inferior radicle.—1 genus.

Affinities.—We have thought it possible to establish that the *Hypericaceæ* present the same type as the *Myrtaceæ*, with the ovary constantly superior and the stamens hypogynous.[3] By that we have determined the place of the *Clusiaceæ*, which differ from the *Hypericaceæ* in a manner quite artificial, viz., by their mostly herbaceous habit, less thick and less coriaceous leaves, hermaphrodite flowers, and filiform stylary divisions. The *Hypericaceæ* having, at once, the coloured latex of the *Clusiaceæ* and the essence reservoirs of the *Myrtaceæ*, are intermediate between them. Moreover, the fleshy and undivided embryo of a great number of *Barringtonieæ* is found in the *Clusiaceæ*. These are ordinarily placed next beside the *Ternstræmiaceæ*, with which their affinities are so close that one might include in one and the same family the *Guttiferæ* and certain *Ternstræmiaceæ*. The latter are distinguished by their alternate leaves, or, in the exceptional types with opposite leaves, by their flowers in clusters, with alternate pedicels, ordinarily hermaphrodite and very rarely tetramerous, so that their sepals and petals are not decussate. Further, the *Ternstræmiaceæ* have not a coloured latex, and the embryo, often curved, has distinct and independent cotyledons, when even they are not largely developed. Finally, the *Clusiaceæ*, scarcely separable from the St. John's Worts, appear equally allied to the *Ternstræmiaceæ* and *Myrtaceæ*.

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[1] *Moronobeæ* Chois.—Endl. –Pl. et Tri.—B. H. *Gen.* 168.

[2] *Calophylleæ* Chois. DC. *Prodr.* i. 561.

[3] *Bull. Soc. Linn. Par.* 78.

USES.[1]—The *Clusiaceæ* have a yellow or greenish, more rarely whitish latex, which contains an acrid resinous matter, often possessing evacuant, sometimes stimulant and tonic properties. The most celebrated, as well as the most active of these substances, is gum-gutta, the production of which has been attributed to several *Garcinieæ*. The best comes from *Garcinia Morella*[2] (fig. 354, 378), and it seems clear, from the most recent researches,[3] that its different varieties alone, whether in Ceylon,[4] in Siam or at Singapore,[5] yield the good gum-gutta used in medicine as a drastic and hydragogue, and in the arts as a yellow colour.[6] *G. Xanthochymus*[7] (fig. 372–375), of India, often pointed out as a source of colouring matter useful in industry, only yields in drops a yellowish or greyish-green resin of very inferior quality. *G. Cambogia*[1] produces a gum-gutta which contains a volatile oil and the resin of which, slightly active as a purgative, is of a pale yellow colour. *G. travancorica*,[2] on the other hand, is said to yield a gum of a beautiful yellow colour, and it is probable that a useful tinctorial matter might be found in several other species,[3] perhaps in those growing in New Caledonia,[4] which in so many characters approach *G. Morella*. The resin of *Mani*,[5] from Guyana, comes also from the latex of a *Clusiacea*, long referred to *Moronobea coccinea*, but which is rather *Symphonia globulifera*,[6] that is the true *Bois-de-cochon* (pigwood) of St. Domingo. Its yellow juice, blackened in the air, is used to tar ships and cordage and to make torches; it burns well without producing much smoke or smell. The species of *Calophyllum* are equally rich in resinous juice, often classed as balm or balsam. The *B. de Marie* of the Antilles[7] is obtained by incising the stem and branches of *C. Calaba*[8] (fig. 381–384); it is greenish, sticky, and tenacious, and is employed as a vulnerary. The *tacamac resin* of Bourbon[9] is said to be extracted in the same manner from *C. Tacamahaca*,[10] a fine tree of the

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[1] Endl. *Enchirid.* 535.—Lindl. *Fl. Med.* 113; *Veg. Kingd.* (1846) 401.—Guib. *Drog. Simpl.* ed. 6, iii. 600.—Rosenth. *Sinop. Pl. Diaphor.* 740, 1150.

[2] Desrouss. *Lamk. Dict.* iii. 201. — Thw. *Enum. Pl. Zeyl.* 49.—*G. Gutta* Wight, *Ill.* 125, t. 44 (excl. syn.)—*G. cambogioides* Royle, *Mat. Med.* ed. 3, 339.—*G. lobulosa* Wall. *Cat.* n. 4868.—*G. elliptica* Wall. *Cat.* n. 4869.—*G. lateriflora* Bl. *Bijdr.* 214.—*G. pictoria* Roxb. *Fl. Ind.* ii. 627.—Wight. *Icon.* i. t. 102.—Chois. *Gutt. de l'Inde*, 37.—*G. acuminata* Pl. et Tri. *Ann. Sc. Nat.* sér. 4, xiv. 355.—*G. Gaudichaudii* Pl. et Tri.—*Guttifera vera* Kœn.—*Carcapuli dictus magnit. cerasi* Linsch. *It.* (trans. de Bry) 100.—*Arbor indica gummi-guttam fundens* . . .—Herm. *Mus. Zeyl.* 26.—*Stalagmitis cambogioides* Murr. *Comm. Gœtt.* ix. 73 (part).—*Hebradendron cambogioides* Grah. *Hook. Comp. Bot. Mag.* ii. 199, t. 27.—*Cambogia Gutta* Lindl. *Veg. Kingd.* 400 (part). — *Hebradendron pictorium* Grah. *Hook. Comp. Bot. Mag.* ii. 199 (*Gokatu, Kana Goraka*).

[3] Hanb. *Trans. Linn. Soc.* xxiv. 489, t. 50.—De Lanessan, *Du. g.* Garcinia *et de l'orig. de la Gomme-gutte*, *Adansonia*, x. 283, t. 31.—Guib. *loc. cit.* 602, fig. 734.—Hanb. et Flück. *Pharmacogr.* 77.—Hook. f. *Fl. Brit. Ind.* i. 264, n. 14.

[4] Var. *sessilis* (Hanb. *loc. cit.*).

[5] Var. *pedicellata* (Hanb. *loc. cit.*). J. Hooker (*Journ. Linn. Soc.* xiv. 485) gives to this variety the name *Garcinia Hanburyi*. The flowers of *G. pictoria* Roxb. being pedicellate, this latter name ought perhaps to be adopted, if the species is really distinct.

[6] They contain from 15 to 20 per cent. of gum soluble in water, not the same as gum arabic, and a resin soluble in alcohol, which it colours a reddish yellow, neutral or slightly acid, forming with alkalis a deep-coloured solution.

[7] Hook. f. *Fl. Brit. Ind.* i. 269, n. 28.—*X. pictorius* Roxb. *Pl. Corom.* ii. 51, t. 196; *Fl. Ind.* ii. 633.—*X. tinctorius* DC. *Prodr.* i. 562.—Chois. *Guttif. Ind.* 32.—Guib. *loc. cit.* 611.

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[1] DESROUSS. *Lamk. Dict.* iii. 701.—ROXB. *Pl. Corom.* iii. t. 298; *Fl. Ind.* ii. 621.—HOOK. F. *Fl. Brit. Ind.* i. 261, n. 6.—*G. xeylanica* ROXB. *Fl. Ind.* ii. 621.—*G. elliptica* WALL. (ex HOOK. F. *loc. cit.*).

[2] BEDD. *Fl. Sylv.* t. 173.—HOOK. F. *Fl. Brit. Ind.* i. 268, n. 25.—HANB. et FLÜCK. *Pharmacogr.* 79.

[3] As such are mentioned *G. Kydia* ROXB. *lanceolata* ROXB. and *ovalifolia* (*Stalagmites ovalifolius* G. DON. — *Xanthochymus ovalifolius* ROXB.); but it is at least doubtful if their juice will yield a good gum-gutta. The same may be said of *G. indica* CHOIS. (*DC. Prodr.* i. 561), syn. of *G. celebica* DESROUSS. (*Dict.* iii. 700). The latter is especially remarkable for the production of a concrete oil called *Kokum Butter*, which is extracted from the dried seeds by bruising and boiling them in water, on the surface of which this fat floats. (HANB. et FLÜCK. *Pharmacogr.* 79.) It has been suggested as serviceable in pharmacy and for making candles, but it is doubtful if it could be obtained in sufficient quantity in Europe for this industry.

[4] Especially *G. collina* VIEILL.—PANCH. et SÉB. *Not. Bois N.-Caléd.* 223 (*Mou* of the natives, *Faux Houp*).

[5] GUIB. *op. cit.* 611.

[6] L. F. *Suppl.* 302.—PL. et TRI. *Ann. Sc. Nat.* sér. 4, xiv. 287.—OLIV. *Fl. Trop. Afr.* i. 163.—*Moronobea globulifera* AUBL. *Guian.* t. 313, *a–j.*—*M. globulifera* SCHLTL. *Linnæa*, viii. 189.—*Aneuriscus exserens* PRESL. *Symb.* 48.—*A. Aubletii* PRESL. *op. cit.* 72.—*Mawna-tree* BANCR. *Nat. Hist. Guian.* (1763) 74.—*Hog gum-tree* BANCR. *Hook. Journ. Bot.* iv. 144.—*Mani resinifera* ... BARR. *Fr. Équin.* 76 (*Oanani* of the Brazilians).

[7] GUIB. *op. cit.* 612.

[8] JACQ. *Amer.* 269, t. 105.—H. B. K. *Nov. Gen. et Sp.* v. 202.—DESCOURT. *Fl. Ant.* ii. t. 74.—*C. Inophyllum*, B. *Calaba* LAMK. *Dict.* i. 553.—*Calaba folii citri splendente* PLUM. *Gen.* 39, t. 18 (*Galba*, *Lignon*, *Parétuvier*, *Aceite de Maria*, *Resina Ocuje* of the Cubans). M. TRIANA (*Ann. Sc. Nat.* sér. 4, xv. 251) distinguishes from it *C. Mariæ* (*Arbol del Aceite de Maria* of the Colombians).

[9] GUIB. *op. cit.* 613.

[10] W. *Berg. Mag.* (1811) 79 (part).—CHOISY, *Prodr.* i. 562.—CAMBESS. *Mém. Gutt.* 26, t. 17, fig. c, 1, 2.—PL. et TRI. *loc. cit.* 286.—*C. Inophyllum* LAMK. *Dict.* i. 552 (not L.).—*C. lanceolarium* ROXB.—*C. lanceolatum* BL.

Mascarene isles; the balsam of *focot* and *angelic tacamac* of Madagascar have also been attributed to *Calophyllum.* In Peru, *C. thuriferum* gives a yellowish resinous juice having the properties of incense. That of *C. Inophyllum*,[1] a species common in Asia, Oceania, and Africa, is purgative and vomitive, and the bark of the same tree is extolled as diuretic. The American *Rheedia* has analogous properties. *Mesua*, especially *M. ferrea*[2] (fig. 380) and *speciosa*,[3] Indian species, have a root and a bark bitter, aromatic, sudorific. The fruit is acrid and purgative; the leaves rich in mucilaginous matter. In America, several species of *Clusia* are valued for their latex. That of *C. rosea*[4] (fig. 355, 356) is thick, balsamic, and bitter; it is used for the same purposes as pitch and scammony. That of *C. flava* is considered a vulnerary.[6] From the *C. insignis*[7] of Brazil flows abundance of resinous juice. The bitter bark of *C. Pseudochina*[8] has been used to adulterate Peruvian bark. *C. Panapanari*[9] (fig. 359, 360) yields, in Guyana, a yellow juice resembling gum-gutta.

A great number of *Clusiaceæ* are esteemed in both worlds for their fruit. One of the most delicious of tropical Asia is said to be that of *Garcinia Mangostana*[10] (fig. 376, 377). It is a berry with a coloured coriaceous bitter and astringent pericarp. This is rejected and the white sweet aromatic exterior tegumentary layer of the seeds is eaten reported to be of exquisite flavour. Some other Garcinias have edible fruits, but very inferior in quality.[1] In the Antilles much is made of *Mammea americana*[2] (fig. 379); its pericarp is sweet and aromatic, but like that of the Corossols, it is very inferior to our good European fruit. Conserves and beverages are prepared from it. From the flowers, of sweet odour, a refreshing and digestive water is distilled. The fermented juice of the stems also affords a kind of beverage. The fruit of the Indian and African *Ochrocarpus* is edible.[3] The flowers are aromatic and are sometimes used, like the leaves, for perfuming tea.[4] The berry of *Rheedia lateriflora*[5] has the same uses in the Antilles as that of *Mammea*, likewise, in Brazil, that of *Platonia insignis*.[6] That of *Pentadesma butyracea*[7] is highly esteemed in tropical western Africa for the yellowish resinous juice it contains in abundance, which is extracted by incisions; it thickens and becomes a sort of butter much esteemed by the natives, but with a slight turpentine odour and not agreeable to Europeans. Several *Clusiaceæ* have a wood of good quality, especially *Calophyllum*, *Mesua* which in India furnishes the prized iron-wood, in Guyana *Moronobea coccinea*, in New Caledonia *Montrouzeria*.[8] Generally *Clusia* and *Garcinia* have a soft wood. All the *Clusiaceæ*, being from tropical countries, are somewhat difficult of culture; but their thick glabrous opposite leaves with fine nervures produce a fine effect in our warm conservatories, where are found some *Rheedia*, *Mammea*, *Calophyllum*, and *Garcinia*, and *Clusia*[9] with magnificent flowers.

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[1] L. *Spec.* 732 (not Lamk.).—Wight, *Ill.* i. 128; *Icon.* t. 77.—Pl. et Tri. *loc. cit.* 282.—*C. ovatifolium* Nor.—*C. Bintangor* Roxb.—*C. Blumei* Wight.—*Bintangor maritima* Rumph. *Herb. Amboin.* ii. 211, t. 71.—*Ponna, Pouna Maram* Rheed. *Hort. Mal.* iv. 76, t. 38.—*Fooraha* Flac. *Madag.* 139.—*Kalophyllodendron indicum folio subrotundo* Vaill. *Mém. Acad. Par.* (1722) 207. —? *Balsamaria Inophyllum* Lour. *Fl. Cochinch.* (ed. 1790) 470 (*Domba-gass* in Ceylon, *Jamplond* in Java, *Tamana* in Otahiti.

[2] L. *Spec.* 734 (part).—Kosenth. *op. cit.* 745. —*M. Nagaha* Gardn.—*Naghas* Herm. *Zeyl.* 7.—*Arbor Naghas* Burm. *Thes. Zeyl.* 25.—*Nagassarium* Rumph. *Herb. Amboin.* vii. t. 2.

[3] Chois. *DC. Prodr.* i. 562; *Gutt. Ind.* 40.—*Balluta Tsjampacam* s. *Castanea rosea indica* Rheed. *Hort. Malab.* iii. 63, t. 53.

[4] L. *Spec.* 1495.—Turp. *Dict. Sc. Nat.* Atl. t. 156.—Schlchtl. *Linnæa*, viii. 181.—Pl. et Tri. *Ann. Sc. Nat.* sér. 4, xiii. 324.—Rosenth. *op. cit.* 740.—*C. retusa* Lamk. *Ill.* t. 852.—*C. alba* W. (part), *Spec.* iv. 976 (*Figuier maudit*, *Millepieds*, *Cope grande* in Panama, *Cupay* in Venezuela).

[5] L. *Spec.* 1495.—Jacq. *Amer.* 272, t. 167; *Ic. Pict.* t. 251.—DC. *Prodr.* i. 559, n. 3.—Rosenth. *op. cit.* 740.

[6] What has been attributed to the juice of this plant ought probably to be applied to that of *Symphonia globulifera* (p. 418, note 6).

[7] Mart. ex Rosenth. *op. cit.* 741.

[8] Pœpp. ex Rosenth. *loc. cit.*

[9] Chois. *DC. Prodr.* n. 13.—*Quapoya Panapanari* Aubl. *Guian.* ii. 901, t. 344.—H. Bn. *Bull. Soc. Linn. Par.* 77.

[10] L. *Spec.* 635.—DC. *Prodr.* i. 560, n. 1.—Roxb. *Fl. Ind.* ii. 618.—Chois. *Gutt. Ind.* 33.—Hook. *Bot. Mag.* t. 4847.—Pl. et Tri. *Ann. Sc. Nat.* sér. 4, xiv. 325.—Guib. *Drog. Simpl.* ed. 6, iii. 602.—Laness. *Bull. Soc. Linn. Par.* 62.—*Mangostana* Rumph. *Herb. Amb.* i. t. 43.—Garcin, *Act. Angl.* 431, t. 1 (ex W.).—*Mangostana Garcinia* Gærtn. *Fruct.* ii. t. 105.

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[1] *G. celebica* L. *Cambogia* Desrx, *zeylanica* Roxb. *Cowa* Roxb. *purpurea* Roxb. *cochinchinensis* Chois.; *G. cornea* L. the fruit of which is small and indifferent, etc.

[2] L. *Spec.* 731.—Jacq. *Amer.* 268, t. 181, fig. 82; *Tab. Pict.* t. 248.—DC. *Prodr.* i. 561, n. 1.—Turp. *Dict. Sc. Nat.* Atl. t. 157.—Griseb. *Fl. Brit. W.-Ind.* 108.—Lindl. *Fl. Med.* 115.—Guib. *op. cit.* iii. 601.—Rosenth. *op. cit.* 741.—Pl. et Tri. *Ann. Sc. Nat.* sér. 4, xv. 242.—*Mamay* Bauh. *Hist.* i. 72.—*Mammei magno fructu, Persicæ sapore* Plum. *Gen.* 44; *Ic.* 170 (*Mammei, Wild Apricot, St. Domingo Apricot*).

[3] Especially, in India, that of *O. longifolius* (*Calysaccion longifolium* Wight;—*Mammea longifolia* Pl. et Tri.), and in Madagascar that of *O. madagascariensis* (*Tovomita madagascariensis* G. Don.). *O. africanus* Oliv. (*Fl. Trop. Afr.* i. 169) is perhaps the *Mammea africana* Don (*Gen. Syst.* i. 619) the fruit of which is eaten at Sierra Leone.

[4] To this genus perhaps belongs the famous *Cay-may*, with which the Emperor of Hué is said to aromatize his tea.

[5] L. *Spec.* 719.—Tuss. *Fl. Ant.* iii. t. 32.—*Van Rheedia* Plum. ed. Burm. t. 257. In Panama the fruit of *R. edulis* Pl. et Tri. (*Calophyllum edule* Seem.) is eaten. *R. acuminata* (*Verticillaria acuminata* R. et Pav.) is the *Arbol del Aceyte de Maria* of the Peruvians. *Madrono* or *Naranjuelo* of the Colombians is also a *Rheedia*.

[6] Mart. *Nov. Gen. et Spec.* iii. 169, t. 288, fig. 2, t. 289.—Rosenth. *op. cit.* 747.—*Symphonia esculenta* Steud.—*Bacury Moronobea esculenta* Arr. d. Camara.

[7] See p. 404, note 5.—Rosenth. *op. cit.* 744 (*Butter-tree, Tallow-tree*).

[8] Panch. et Séb. *Not. Bois N.-Caléd.* 220.

[9] Particularly *C. rosea* L. *minor* L. *flava* L. *alba* L.

GENERA.

I. CLUSIÆ.

1. **Clusia** L.—Flowers polygamo-diœcious; receptacle shortly convex. Sepals 4–6, decussately imbricate. Petals 4–6 or 7–10, imbricate or contorted-imbricate. Stamens ∞ (in female flower 4–∞, free or variously connate, oftener very short thick), or all united in a globose or cylindrical mass; anthers imbedded; the interior or exterior sometimes concrete sterile; anthers of interior or exterior free; or all anthers free; filaments concrete in mass or shortly free; anthers 2–8-locular, variously dehiscent. Germen (in male flower variously evolved, exserted or enclosed among stamens, sometimes 0) sessile, 4–10-locular; style short or subnil, presently dilated into thick radiating distinct or subconnate or connivent stigmas. Ovules in complete or incomplete cells ∞, subhorizontal or slightly oblique ascending. Fruit thick fleshy or coriaceous, finally septicidally dehiscent. Valves solute from angular-alate columella. Seeds ∞, rarely few, oftener small or moderate-sized, variously arillate; cotyledons of thick fleshy albuminous embryo minute squamiform to apex; radicle thick macropod. Trees or shrubs, sometimes epiphytal, rarely climbing, glabrous, abounding in a resinous juice; leaves opposite exstipulate, coriaceous, entire, subenervate, or delicately penninerved; midrib oftener strong somewhat prominent; flowers at ends of twigs solitary or few cymose, large or rather so, sometimes smaller in compound cymose racemes; bracts under flower 2, or more rarely ∞, decussate. (*Trop. and subtrop. America.*)—See p. 395.

2. **Quapoya** Aubl.—Flowers nearly of *Clusia*, smaller, diœcious; sepals 4, decussate or 5, imbricate. Petals 4, decussate or rarely (*Balboa*) variously imbricate, sometimes 5, imbricate. Stamens 4,

or 5–12, more rarely 12–20 (or sometimes (?) to 40); filaments connate in tube to apex or to greater or less height, sometimes almost entirely free (*Œdematopus*); anthers various in form, either obcuneate, finally recurved and bearing marginal cells, or more or less ovate or oblong and bearing introrsely rimose cells. Staminodes oftener 4–6, hypogynous; filaments free thick or complanate; cells of anther (oftener sterile) conspicuous lateral, effete. Germen (in male flower rudimentary small or 0) sessile, 4–5-locular; style short, presently dilated to disciform more or less lobed stigma. Ovules in cells (complete or incomplete) 2–4, ascending, oblique; micropyle extrorsely inferior, or 5–∞, subhorizontal. Fruit fleshy or coriaceous, finally capsularly dehiscent, septicidal. Seeds in cells few or 1, variously arillate; embryo, etc., of *Clusia.*—Trees or shrubs; habits and leaves of *Clusia*; flowers small in terminal more or less compound ramose-cymiferous racemes. (*Tropical America.*)—See p. 398.

3. **Havetia** H. B. K.—Flowers diœcious small (nearly of *Quapoya*), 4-merous. Sepals and petals decussate. Stamens 4 (in female flower short thick sterile and connate in a cupule), united in a thick subglobose mass; filaments thick, externally convex, internally angular; anthers vertically imbedded; cells suborbicular, 3-nate, internally valvicide. Germen 4-locular; style lobes stigmatose subsessile. Ovules in cells 2–4; inferior ascending; micropyle extrorsely inferior; raphe introrse or lateral. Capsule thick septicidal. Seeds clothed with a lobulate aril springing both from the hilum and from the micropyle; embryo exalbuminous of *Clusia* (or *Quapoya*).—A tree; habit, leaves, inflorescence, etc., of *Quapoya*. (*New Granada.*)—See p. 400.

4? **Pilosperma** Tri. and Pl.—Flowers diœcious? males . . .? Sepals and petals of female flower 4, decussate. Disk cupuliform; externally ∞-striate (staminodes?). Gynæcium and fruit nearly of *Havetia*; seeds in cells 5, 6, solitary or oftener 2-nate, descending, surrounded with cristate aril; raphe subdorsal.—A tree; habit, leaves, inflorescence, etc., of *Quapoya* or *Havetia*. (*New Granada.*)—See p. 400.

5? **Clusiella** Tri. and Pl.—Flowers diœcious; males . . .? Calyx of female flowers imbricate, 5-phyllous. Petals 5, longer, contorted; the exterior sometimes subauriculate. Staminodes ∞, minute, united in hypogynous cupule. Germen 5-locular; lobes of style 5, short stigmatose. Ovules in cells ∞, descending or subhorizontal. Fruit...? —A scandent (?) shrub; branches slender, 2-chotomous; leaves opposite acuminate reticulate-veined; flowers in upper axils or terminal; cymes poor (1-few flowered); branches rather long bearing several (2–4) remote pairs of decussate bracts, at apex 1-flowered. (*Columbia.*)—See p. 400.

6. **Chrysochlamys** Pœpp. and Endl.—Flowers polygamo-diœcious; sepals 4, 5, imbricate. Petals 4–10, imbricate. Stamens ∞, central (in female flower sterile) free or connate in an externally antheriferous cyathus; anthers effete (or sometimes fertile in subhermaphrodite flower), either free and all fertile, or part only fertile; the interior ananthcrous and united in a mass; anthers of fertile stamens small; cells 2, oblique, laterally or introrsely rimose. Germen (in male flower 0, or rarely minute effete) free, 5-locular; style branches stigmatose adnate radiating, free at apex. Ovules in cells solitary, ascending, amphitropous; micropyle extrorsely inferior. Fruit subfleshy, finally septicidal, 5-valvate. Seeds sessile, amphitropous, externally surrounded by a thick membranous aril springing around hilum and sometimes also micropyle, sometimes unequally divided at back; embryo, etc., of *Clusia.*—Trees, with gummy juice; leaves opposite penninerved, inflorescence terminal compound ramose, etc., of *Clusia.* (*Trop. America.*)—See p. 401.

7. **Tovomita** Aubl.—Flowers polygamo-diœcious; sepals 2–4 and petals 4–10, imbricate, often 2-seriate. Stamens ∞; filaments free subulate; anthers often small terminal, 2-locular. Germen 4, 5-locular; style branches same in number short, incrassate and stigmatose at apex or nearly from base. Ovules in cells solitary ascending, often amphitropous; micropyle extrorsely inferior. Fruit oblong or pear-shaped fleshy, finally capsularly dehiscent, 4–5-valvate; seeds exarillate or furnished with an external coat thickened to a general fleshy aril; embryo, etc., nearly of *Clusia* (or *Chrysochlamys*).—Trees or shrubs, with resinous juice; leaves opposite entire penninerved, opaque or pellucid-lineate; flowers (small) in umbelliform more or less compound (often 3-chotomous) cymes. (*Trop. America*). —See p. 401.

8? **Allanblackia** Oliv.—Flowers nearly of *Clusia*, 5-merous; sepals unequal and petals imbricate. Stamens ∞ (in female flower sterile very short thick), in 5 oppositipetalous groups; anthers subsessile, 2-locular, 2-rimose. Germen (in male flower rudimentary, 5-lobed) thick conical, 1-locular; placentæ 3, parietal, little prominent; ovules ∞, 2-seriate on each placenta, ascending; style soon dilated to undivided stigmatose peltate head. Fruit . . . ?—A glabrous tree; opposite leaves, etc., of *Clusia*; flowers terminal, rather long pedicellate, disposed in a compound cymose umbelliform raceme. (*Trop. west. Africa.*)—See p. 401.

II. SYMPHONIEÆ.

9. **Symphonia** L. F.—Flowers hermaphrodite; sepals 5, unequal; the exterior shorter, much imbricate. Petals 5, alternate, contorted; bud subglobose. Stamens 5-adelphous; groups oppositipetalous, 3–5-androus; anthers extrorsely adnate, muticous at apex or superior with apiculate connective; cells linear, longitudinally rimose. Disk exterior to andrœcium, cupular, subentire or shortly 5-crenate. Germen enclosed in staminal tube, 5-locular; style elongate, at apex radiately 5-lobed; lobes at top of minute apex foveolate-stigmatose. Ovules in cells (complete or incomplete) ∞, ascending; micropyle extrorsely superior. Fruit baccate; cotyledons of thick undivided exalbuminous embryo 0.—Trees or shrubs, with yellow juice; leaves opposite exstipulate, thinly coriaceous, 1-nerved, closely parallel penninerved; flowers terminal, solitary or generally spuriously umbellate cymose pedicellate. (*Trop. America, Malacca, trop. west. Africa.*)—See p. 402.

10? **Moronobea** AUBL.—Flowers nearly of *Symphonia*; bud ovoid. Disk lobes 5, alternating with as many staminal groups; filaments in each 5, 6, long linear and spirally twisted around gynœcium, extrorsely antheriferous nearly from base; cells adnate linear. Germen, etc., of *Symphonia*; ovules in cells few ascending. Fruit subligneous acuminate; seeds solitary or few exalbuminous.—Lofty trees with copious greenish juice; leaves thick opposite; flowers large solitary terminal. (*Trop. America.*)—See p. 403.

11? **Montrouziera** PANCH.—Flowers nearly of *Symphonia*; bud subglobose. Staminal groups 5, alternating with as many glandules of disk vertically produced (or sometimes 0); each divided into 5–10 linear extrorsely adnate muticous anthers. Germen, etc., of *Symphonia*; ovules in cells ∞, 2-seriate, ascending or subhorizontal; micropyle extrorsely lateral. Berry corticate, indehiscent; seeds in cells few; embryo of *Symphonia.* — Shrubs or small trees, with yellowish juice; leaves opposite or subverticillate coriaceous, penninerved entire; flowers solitary at the ends of twigs or growing from the wood, pedicellate or subsessile. (*New Caledonia.*)—See p. 404.

12? **Pentadesma** Sab.—Flowers nearly of *Symphonia*; sepals 5, very unequal and imbricate, the interior larger. Petals 5, rather longer than the interior sepals. Stamens ∞, very shortly 5-adelphous; groups alternating with as many rather prominent glandules of disk, in each ∞, linear elongate; anthers extrorsely adnate above the middle; cells linear rimose. Germen, etc., of *Symphonia*; ovules in cells few ascending. Fruit baccate corticate, indehiscent, resinifluous; seeds in cells few or 1; embryo undivided.—A lofty tree, with yellow juice; leaves opposite coriaceous entire finely and closely penninerved; flowers large terminal solitary. (*Trop. west. Africa.*)—See p. 404.

13? **Platonia** Mart.—Flowers nearly of *Symphonia*; bud ovoid. Staminal groups 5, alternating with as many angular and rather prominent lobes of the disk; each divided into ∞ straight filaments; anthers extrorsely adnate above middle of filament, muticous. Germen, etc., of *Symphonia*; ovules in cells ∞, ascending. Fruit baccate, indehiscent, 5-locular; seeds in cells solitary exalbuminous.—Large trees; leaves opposite coriaceous, finely and closely penninerved; flowers large terminal solitary. (*Trop. America.*)—See p. 404.

III. GARCINIEÆ.

14. **Garcinia** L.—Flowers polygamous, 4-merous, or more rarely (*Xanthochymus*) 5-merous; sepals imbricate, oftener unequal; the exterior smaller. Petals 4, 5, alternate, imbricate. Stamens ∞, either connate in 4, 5, groups few-anthered at apex, or free or connate in entire or 4–6-lobed mass; anthers various in form, either elongate, 2-rimose, or poricid or peltate, 4-locellate or operculately dehiscent (in female flower rudimentary or 0). Germen (in male flower rudimentary or effete) 2–∞ -locular, oftener 4–5-locular; style

more or less elongate, at apex stigmatose peltate, entire or radiately lobed, torulose or depressed or tuberculate (in male flower sometimes evolved with effete germen). Ovules in cells (complete or incomplete) solitary ascending; micropyle extrorsely inferior. Fruit indehiscent, baccate, often corticate. Seeds ∞, or few; external coat pulpy arilliform; radicle of thick exalbuminous embryo macropod; cotyledons very small or 0.—Trees oftener glabrous, generally with yellow juice; leaves opposite, oftener entire coriaceous; flowers axillary or terminal cymose or in a compound cymiferous raceme, more rarely solitary. (*Trop. west. Africa, Malacca, trop. Asia and Oceania.*)—See p. 405.

15 ? **Rheedia** L.[1]—Flowers nearly of *Garcinia*, 4-merous; sepals 2, free or more or less connate, imbricate or valvate. Petals 4, decussate. Stamens ∞; anthers longitudinally rimose. Germen 3–5-locular; ovules solitary, etc., of *Garcinia*. Berry corticate, 1–5-spermous; seed and embryo of *Garcinia*.—Trees with yellow juice; leaves and inflorescence of *Garcinia*. (*Trop. America, Madagascar, trop. west. Africa.*[2])

16 ? **Ochrocarpus** Dup.-Th.[3]—Flowers nearly of *Garcinia*; calyx valvate, closed before anthesis and finally 2-valvately fissus. Stamens ∞, free or 4–8-adelphous; anthers elongate or short. Germen 2–6-locular, etc., of *Garcinia*; cells 1, 2-ovulate; ovules ascending. Fruit baccate, often 1-spermous; embryo undivided.—Trees; leaves opposite or verticillate (of *Garcinia*); flowers lateral or axillary cymose. (*Trop. Asia and Oceania, Malacca, trop. west. Africa.*[4])

IV. MAMMEEÆ.

17. **Mammea** Pl.—Flowers polygamo-diœcious; calyx gamophyllus, valvate, closed before anthesis, finally divided into 2 sepals. Petals 4–6, imbricate or not contiguous. Stamens ∞, free or connate at base, erect; filaments free slender; anthers oblong erect; cells

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[1] *Gen.* n. 641.—Pl. et Tri. *Ann. Sc. Nat.* sér. 4, xiv. 306.—B. H. *Gen.* 175, n. 18.—*Verticillaria* R. et Pav. *Prodr.* 81, t. 15.—*Chloromyron* Pers. *Enchirid.* ii. 73.—*Lamprophyllum* Miers, *Trans. Linn. Soc.* xxi. 249, t. 26.

[2] Spec. about 15. Chois. *Gutt. Ind.* t. 4, 5.

[3] *Gen. Nov. Madag.* 15.—Pl. et Tri. *Ann. Sc. Nat.* sér. 4, xiv. 364.—B. H. *Gen.* 175, 980, n. 19.—*Calysaceion* Wight, *Ill.* t. 130; *Icon.* t. 1999.

[4] Spec. 6, 7. Miq. *Ann. Mus. Lugd.-Bat.* i. 209.—Oliv. *Fl. Trop. Afric.* i. 169.—Pl. et Tri. *Ann. Sc. Nat.* sér. 4, xiv. 244 (*Mammea*, n. 2–6).—H. Bn. *Bull. Soc. Linn. Par.* 82.—Walp. *Ann.* vii. 355.

adnate linear, introrse or extrorse, longitudinally rimose. Germen (in male flower rudimentary or 0) sessile 2-locular; style cylindrical erect rather thick, at apex stigmatose capitately 2-lobed. Ovules in cells 2 each, collaterally ascending, anatropous; micropyle extrorsely inferior. Fruit drupaceous, 1-spermous (rarely 2–4-spermous); putamen thick, externally fibrous. Seeds suberect; cotyledons of fleshy exalbuminous embryo large thick plano-convex conferruminate with resinous channels; radicle very short inferior.—Trees; leaves alternate pellucid punctate closely and finely reticulate-penninerved; flowers axillary solitary or few cymose; pedicels short rather thick. (*Trop. America.*)—See p. 408.

18. **Kayea** WALL.—Flowers nearly of *Mammea*, hermaphrodite or polygamous; calyx 4-phyllous, imbricate. Petals 4, imbricate. Stamens ∞; filaments long filiform, corrugate; anthers small subglobose; cells 2, short, rimose. Germen 2-locular; style elongate, at apex shortly and sharply 4-fid. Ovules in cells (complete or oftener incomplete) 2 each, collaterally ascending; micropyle extrorsely inferior. Fruit fleshy, indehiscent, girt by more or less persistent and enlarged and incrassate calyx; seeds 1–4; embryo, etc., of *Mammea.*—Trees; leaves oblong, very finely penninerved; flowers (rather large or small) in terminal compound cymiferous racemes or more rarely solitary. (*Trop. Asia and Oceania.*)—See p. 409.

19. **Mesua** L.—Flowers nearly of *Kayea*, hermaphrodite or polygamous, 4-merous. Stamens ∞; anthers oblong. Germen 2-locular; style elongate, at apex stigmatose peltate. Ovules in cells 2, ascending, etc., of *Kayea* (or *Mammea*). Fruit subligneous or rather fleshy, finally 4-valvate. Seeds 1–4, exarillate; embryo of *Mammea.*—Trees or shrubs; leaves finely and closely penninerved; flowers (large) exarillary solitary. (*Trop. Asia and Oceania.*)—See p. 409.

20 ? **Pœciloneuron** BEDD.—Flowers nearly of *Kayea*; "sepals 4–5, imbricate. Petals 4–6, contorted. Stamens ∞; filaments short or 0; anthers basifixed erect linear. Germen 2-locular; ovules in cells 2, etc., of *Kayea*; styles 2, subulate; at apex stigmatose punctiform. Fruit ovoid capsular, 1-locular, septicidal (?); seed 1, erect; embryo of *Kayea.*—Trees, habit of *Clusia*; leaves opposite coriaceous, finely penninerved; flowers axillary solitary or terminal paniculate. (*East. India.*)"—See p. 410.

21. **Calophyllum** L.—Flowers polygamous (nearly of *Mammea*); sepals oftener 4, imbricate; the interior sometimes petaloid. Petals 2–8 (more rarely 0), imbricate. Stamens ∞; filaments free or polyadelphous at base, more rarely 1-adelphous; anthers oblong or linear, basifixed, introrse or extrorse, 2-rimose. Germen (in male flower rudimentary or 0) 1-locular; style slender or subulate, at apex stigmatose capitate or cupular, entire or lobulate. Ovule 1, suberect or ascending; anatropous; micropyle inferior. Fruit drupaceous; flesh oftener scanty, finally suberose; putamen crustaceous; seed ascending; embryo thick exalbuminous, etc., of *Mammea*.—Trees or shrubs; leaves opposite or subverticillate, entire coriaceous nitid very closely striato-penninerved; flowers in axillary and terminal compound cymiferous racemes. (*Trop. Asia*, *Oceania*, *and America.*) —See p. 410.

V. QUIINEÆ.

22. **Quiina** Aubl.—Flowers polygamous; sepals 4–5, unequal, imbricate. Petals 4–8, either free, or connate at base with each other and with the stamens, imbricate or imbricately convolute. Stamens ∞, hypogynous; filaments free or connate at base, corrugately flexuose in bud; anthers small sub-2-dymous; cells subglobose, at margin or introrsely rimose. Germen (in male flower rudimentary or 0) sessile, 2–4-locular; styles 2–4, slender, distinct at base, more or less plicate in bud, at apex stigmatose capitate or discoid. Ovules in cells 2, ascending; micropyle extrorsely inferior. Fruit baccate, sometimes juiceless; endocarp fibrous, sometimes scarcely or tardily unequally 2–4-valved. Seeds few or oftener 1, externally tomentose, cotyledons exalbuminous embryo fleshy plano-convex; radicle conical inferior rather short.—Trees or shrubs, sometimes climbing, with gummy juice; leaves opposite or verticillate, entire or crenate, sometimes dentate or unequally pinnatipartite (*Touroulia*), penninerved, nervose, finely vein-lined; stipules (?) 2, narrow, rather rigid, sometimes foliaceous; flowers (small) in axillary or terminal more or less compound cymiferous and divaricately racemose racemes. (*Trop. America.*)—See p. 411.

LVII. LYTHRARIACEÆ.

I. SALICARIA SERIES.

In the Salicarias[1] (fig. 386–393), the flowers are regular, hermaphrodite, with four, five, or six parts. The receptacle has the form of a long tube, of little thickness,[2] at the top of which is inserted the

Lythrum Salicaria.

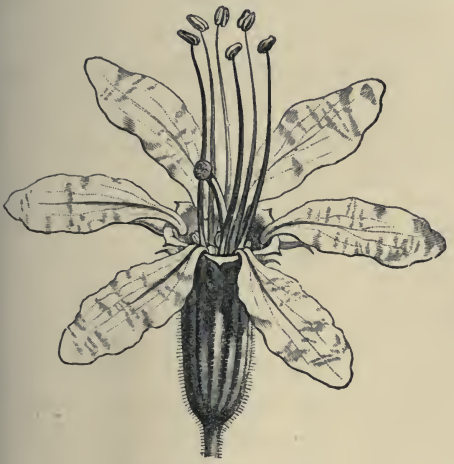

Fig. 387. Flower (4/1).

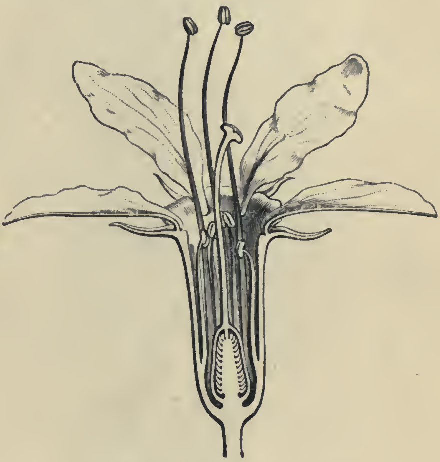

Fig. 389. Long. sect. of flower.

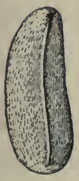

Fig. 391. Seed.

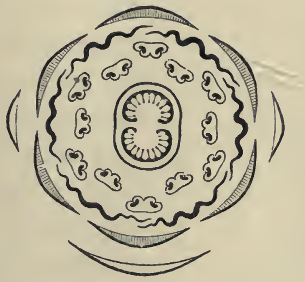

Fig. 388. Diagram.

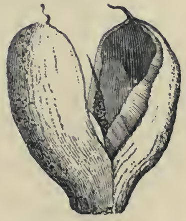

Fig. 390. Dehiscent fruit.

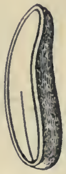

Fig. 392. Long. sect. of seed.

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[1] *Lythrum* L. *Gen.* n. 604 (part).—J. *Gen.* 332. —Gærtn. *Fruct.* i. 269, t. 62.—Lamk. *Ill.* t. 408.—Poir. *Dict.* vi. 451; Suppl. v. 26.—Spach, *Suit. à Buffon*, iv. 419.—DC. *Mém. Genève*, iii. p. ii. 77; *Prodr.* iii. 80.—Endl. *Gen.* n. 6149.—Payer, *Organog.* 477, t. 95.—B. H. *Gen.* 779, n. 10.—H. Bn. *Payer Fam. Nat.* 353. —*Salicaria* T. *Inst.* 253, t. 129.—Adans. *Fam. des Pl.* ii. 234.

[2] Traversed by 8–12 vertical ribs, most frequently without any very distinct glandular layer within, this tube is ordinarily described as a calicinal tube.

Lythrum Salicaria.

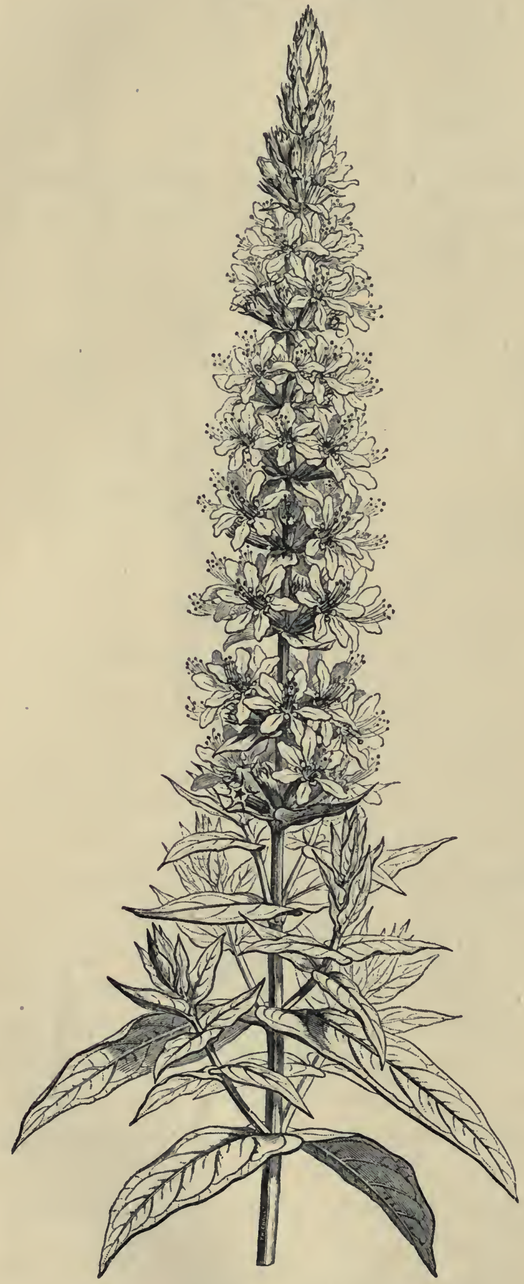

Fig. 386. Floriferous branch.

perianth. The latter presents, in the case of a hexamerous flower, six valvate sepals, with which alternate exteriorly five tongues and interiorly five petals. The latter are attenuate at the base, imbricate and corrugate in the bud. Of the twelve stamens, six are superposed to the sepals, longer and exserted; the filaments are attached in the upper part of the receptacular tube, and the anthers are bilocular, introrse,[1] dehiscing by two longitudinal clefts.[2] The six other stamens, shorter and inserted lower beneath the petals, have smaller anthers often wholly or in part sterile. The gynæcium, free at the bottom of the receptacular tube, is formed of a bilocular ovary, the base of which slightly thickens into a disk, and its summit is attenuated to a style, terminated by an obtusely bilobed stigmatiferous head. On the partition separating the cells is a large placenta bearing a great number of ascending and anatropous ovules, with micropyle inferior and exterior. The fruit, around which persists the receptacular tube, is a bilocular membranous capsule, septicidal or opening irregularly at maturity, the numerous seeds of which contain under their coats a fleshy embryo, with plano-convex cotyledons, auriculate at base, and a conical inferior radicle. The Salicarias are herbaceous plants or shrubby at the base, glabrous or covered with hairs, with tetragonal branches, opposite, verticillate or rarely alternate leaves, entire, without stipules, and flowers[1] united in cymes generally biparous, in the axils of the leaves or bracts which replace them at the top of the branches, in such a manner as, in this case, to form long terminal clusters of cymes (fig. 386, 393). Some oppositipetalous stamens are then reduced to very small dimensions or even disappear entirely, and the petals are somewhat unequal, the two superior surpassing the four others. Such is *L. anomalum*,[2] a Brazilian plant which has become the type of the genus *Anisotes*.[3] The style is sometimes short and sometimes long and exserted, and there are some species in which the ovary is not unfrequently trilocular.[4] A dozen[5] Salicarias are known; they inhabit all the temperate regions of the world, and especially marshy localities.

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[1] Short, versatile, often coloured red or brown when fertile.

[2] The pollen is " ellipsoid ; six folds ; in water, six bands, on three of which a papilla. *Lythrum*

Lythrum virgatum.

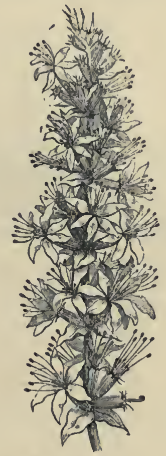

Fig. 393. Portion of inflorescence.

L. pungens and two other Chilian species constitute the genus *Pleurophora*. They are herbaceous or subshrubby plants, with small stiff sharp-pointed leaves. The flowers, ordinarily collected in terminal spikes, are 5–7-merous, 5–20-androus, and the gynæcium is composed of a stipitate, eccentric, obliquely compressed, pauciovulate

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Salicaria, L. thymifolium." (H. Mohl. *Ann. Sc. Nat.* sér. 2, iii. 331.)

[1] Red, pink, more rarely white.

[2] A. S.-H. *Fl. Bras. Mer.* iii. t. 186.

[3] Lindl. *Introd.* ed. 2, 101, 441. The stamens are often reduced to from five to seven in this species, which appears in other respects to connect *Lythrum* with *Cuphea*.

[4] Especially *L. arnhemicum* (F. Muell. *Fragm.* ii. 107;—Benth. *Fl. Austral.* iii. 299).

[5] H. B. K. *Nov. Gen et Sp.* vi. 192.—A. S.-H *op. cit.* 129.—Benth. *op. cit.* 298.—Gren. et Godr. *Fl. de Fr.* i. 593.—G. Bœck. *Œstr. Bl.* [1853] 405.—Boiss. *Fl. Or.* ii. 738.—Hiern. *Fl. Trop. Afr.* ii. 465.—Harv. and Sond. *Fl. Cap.* ii. 516.—C. Gay, *Fl. Chil.* ii. 368.—A. Gray, *Man.* ed. 5, 183.—Fr. et Sav. *Jap.* 167.—*Bot. Mag.* t. 1003, 1812.—Walp. *Rep.* ii. 103; v. 674; *Ann.* ii. 539; iv. 688.

ovary, which has most frequently but one cell and a single placenta, surmounted by an eccentric style, with a stigmatiferous summit not enlarged. All the other characters of the flower are those of *Lythrum*.

Nesœa (fig. 394, 395) is distinguished from the Salicarias by characters of very secondary scientific importance. The receptacle, however, is not the same, for, with the calyx which surmounts it, it represents a campanulate sac, traversed by salient nervures to the number of twelve or fourteen. The sepals, variable in number (4–8), are valvate, and alternate with as many exterior tongues, analogous to those of *Lythrum*. The petals, equal and sessile or unguiculate, according to the species, are the same in number, and the stamens double in number on two verticils. The ovary, as also the capsular fruit, has from three to six multiovulate cells, and the valves of the latter, at maturity, separate, with the partitions, from the placentæ charged with seeds. *Nesœa* comprises African and American herbaceous shrubby or subshrubby plants; the leaves are opposite or verticillate, and the flowers are in cymes varying in the three sections (*Eunesœa*, *Heimia*, *Decodon*) admitted in the genus.

Nesœa salicifolia.

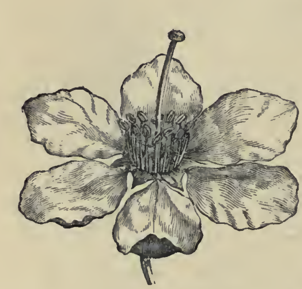

Fig 394. Flower.

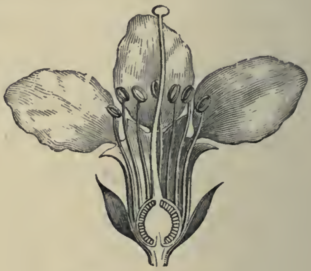

Fig. 395. Long. sect. of flower.

Ginora is somewhat analogous to *Nesœa*, and the flowers are 5–6-merous; but the sepals inserted at the margin of a turbinate receptacle, externally smooth, have no alternate accessory tongues; there are from twelve to twenty-four stamens, with curved anthers, an ovary with four multiovulate cells and a loculicidal four-valved capsule. Only one species is known, from Cuba. *Dodecas*, a shrub from the sea-shores of tropical America, has nearly the flowers of *Ginoria*, tetramerous, with no accessory tongues or scarcely visible outside the sepals, from eight to ten stamens, with oblong, finally erect anthers, and four cells in the ovary. The capsular fruit is finally nearly unilocular, with numerous scobiform seeds, inserted on a false central placenta. The surface of the seeds is hispid, and the flowers, rather large, are axillary, solitary, or grouped in few-flowered cymes.

Adenaria (fig. 396, 397) comprises also tropical American plants; like *Dodecas*, they have an obconical or campanulate receptacle, four or five sepals, without accessory tongues, and a diplostemonous andrœcium inserted higher or lower on the internal wall of the receptacle. The ovary, with short foot, has two multiovulate cells, and the capsular fruit is obovoid, with an indefinite number of glabrous seeds. The two or three adenarias known are trees with opposite leaves and with axillary corymbiform and many-flowered cymes. Nearly all the parts are covered with dark punctiform glands. Very little different from *Adenaria* is *Grislea secunda*, a shrub of Columbia and Venezuela, but it has dentiform tongues alternating with its four or five sepals, and all the stamens are inserted quite at the base of the gynæcium. Its capsular fruit is globular, with seeds equally glabrous. In *Woodfordia floribunda*, a shrub of India, China, Madagascar, and tropical eastern Africa, which has been referred to the genus *Grislea*, there are also black glandular points on the greater part of the organs; but the flowers are not regular. The receptacular tube has an oblique superior opening, and the flower as a whole is bent. There are from five to seven dentiform valvate sepals, with as many small accessory tongues and very small petals. The stamens are declinate, twice as many as the sepals, in two verticils, and the largest oppositipetalous. The fruit is a loculicidal bivalve capsule, with numerous seeds, covered with hairs or papillæ. This genus also closely connects *Lythrum* with the following type.

Adenaria purpurata.

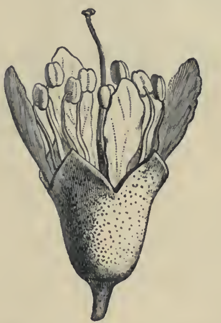

Fig. 396. Flower ($\frac{8}{1}$).

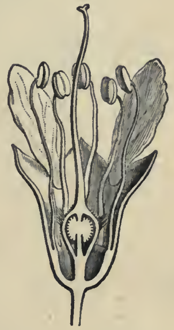

Fig. 397. Long. sect. of flower.

Cuphea (fig. 398–404), which cannot but be considered a very near ally of the Salicarias, forms however a small group (*Cupheeæ*) characterized by the constant irregularity of the flower. It has a receptacular tube traversed by longitudinal ribs, and dilated below and posteriorly to a more or less prominent spur. The mouth of this tube bears six valvate sepals with an equal number of accessory teeth more or less developed. The six petals are nearly equal or oftener unequal, the posterior being most developed; they may even be wanting. The andrœcium is generally formed of eleven stamens, of which six are superposed to the petals and five to the sepals; the stamen constantly wanting is that which would correspond to the sepal superposed to the spur. The gynæcium much resembles that of the Salicarias; but its posterior side bears at the base a gland, more or less developed, sometimes circular, which projects into the cavity of the spur. The two cells of the ovary are multiovulate, or rather the posterior remains sterile, and the ovules, in number very variable (from two to a hundred), are ascending and anatropous. The placenta bearing them may become partly free in consequence of the more or less complete disappearance of the interlocular partition. The fruit is a capsule. All the Cupheas known are natives of the warm regions of the new world. Their leaves are opposite, verticillate or rarely alternate, and the flowers, solitary or grouped in cymes, are axillary or raised to the interval of the two opposite leaves situated above.

Cuphea lanceolata.

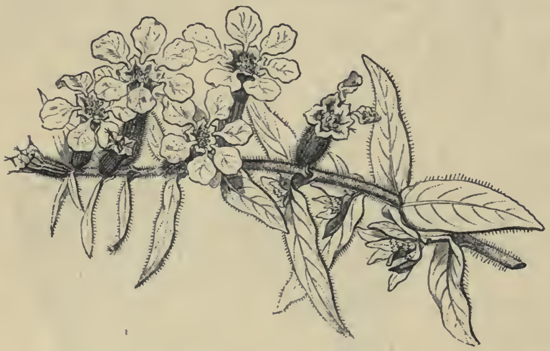

Fig. 398. Floriferous branch.

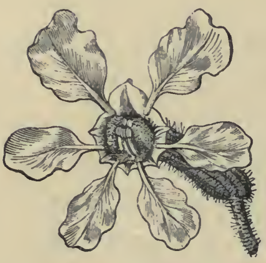

Fig. 399. Flower with petals nearly equal.

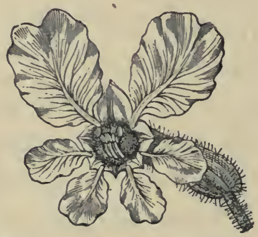

Fig. 400. Flower with petals very unequal.

In the following genera, the general organization of the flowers is primarily nearly the same as in the preceding types; but they are separated artificially by the fruit, instead of remaining enclosed in the receptacular tube, being finally partly exserted. It is so in *Antherylium*, the flowers of which are otherwise very similar to those of *Adenaria*, *Grislea*, etc. They are tetramerous, without accessory tongues alternating with the petals, and have from twelve to an indefinite number of stamens. The ovary has four multiovulate cells, and the fruit is a septifragal capsule. They are woody plants of Mexico and the Antilles. *Tetrataxis*, a tree of Mauritius, has the same organs of vegetation and tetramerous but apetalous flowers, and only four alternisepalous stamens. Its fruit is a septifragal capsule. In *Lagerstrœmia* (fig. 405, 406), beautiful trees or shrubs of eastern Asia, the flowers, pentamerous or hexamerous, have the petals well developed, with a long narrow claw, an elegantly undulated limb, and an indefinite number of stamens. The fruit, surrounded only at the base by the receptacular cupule, is free above: it is a loculicidal and 3–6-valved capsule, the numerous seeds of which are prolonged upwards in a membranous wing. The leaves are opposite or verticillate, and the flowers, often very beautiful, are grouped in ramified clusters of cymes. *Duabanga* is from tropical Asia and Oceania. Very near *Lagerstrœmia*, it has a larger

Cuphea micropetala.

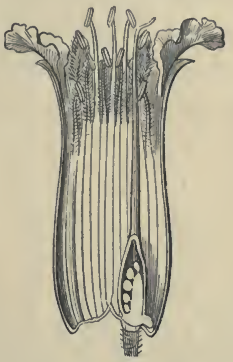

Fig. 401. Long. sect. of gynæcium of open flower.

Cuphea pubiflora.

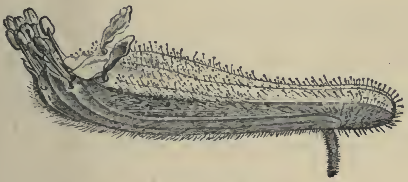

Fig. 402. Flower.

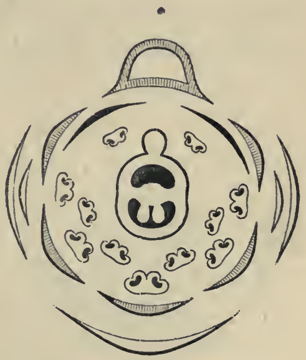

Fig. 403. Diagram.

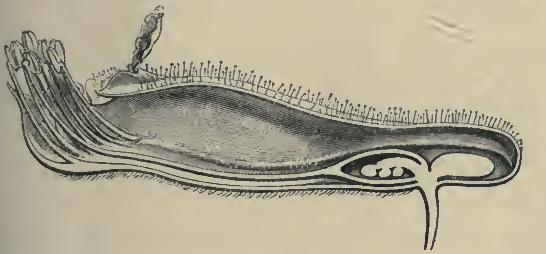

Fig. 404. Long. sect. of flower.

and more open receptacle, from four to seven thick triangular and valvate sepals, an equal number of petals, very numerous stamens, and an ovary with 4–8 multiovulate cells. The capsular fruit supported by the receptacular cupule, is loculicidal and polyspermous. The seeds are small, scobiform, curved and irregularly winged. *Lawsonia* may be considered a reduced type of the preceding genera. The small flowers (fig. 407–409) have only four parts, a diplostemonous andrœcium, and four multiovulate cells in the ovary. But the receptacular cupule encircles only the base of the coriaceous capsule, which finally breaks in an irregular manner. In the flower this cupule is lined by a glandular disk, which thickens, near the throat, to four slightly salient glands, corresponding in pairs to the sepals, interior to the insertion of the staminal filaments, and four others, a little higher, situate within the petals. The fruit is polyspermous, and the seeds, irregularly pyramidal, have a thick spongy exterior coat, not prolonged to a wing. The only species known (*L. inermis*) is a glabrous shrub, with branches often spinous,

Lagerstrœmia indica.

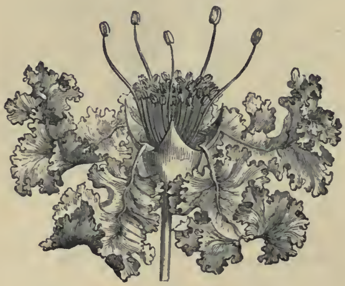

Fig. 405. Flower.

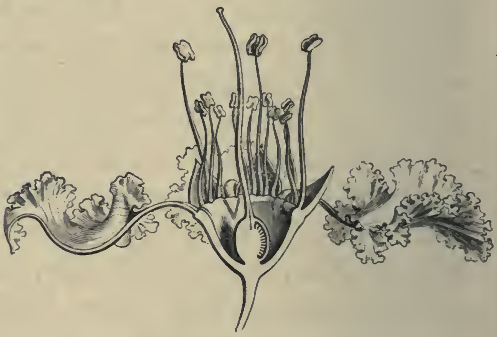

Fig. 406. Long. sect. of flower.

Lawsonia inermis.

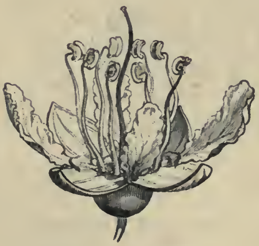

Fig. 407. Flower.

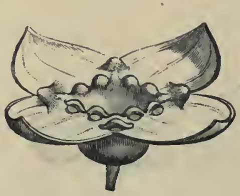

Fig. 408. Floral receptacle.

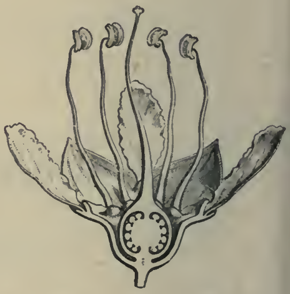

Fig. 409. Long sect. of flower.

opposite leaves and inflorescence similar to that of *Lagerstrœmia.* It is believed to be a native of Arabia or of the neighbouring countries, African or Asiatic; it has been introduced into most tropical regions.

Pemphis (fig. 410, 411), otherwise little different from most of the preceding genera, belongs also to a small group (*Pemphideæ*), characterized by a variation in the mode of placentation. The latter is nearly basilar, that is, from the base of the internal angle of each ovarian cell rises a small support on which are borne a variable number of anatropous, ascending ovules. The flower is moreover hexamerous, with six accessory tongues in the intervals of the sepals, six petals resembling those of *Lagerstrœmia*, and twelve stamens, inserted at two different levels on the receptacular tube. The fruit is capsular and enclosed in the receptacle. *P. acidula*, the only species known, is a small shrub observed at numerous points of the sea coast of tropical Asia and Oceania.

Pemphis acidula.

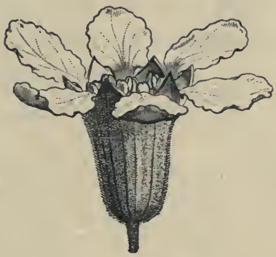

Fig. 410. Flower ($\frac{2}{1}$).

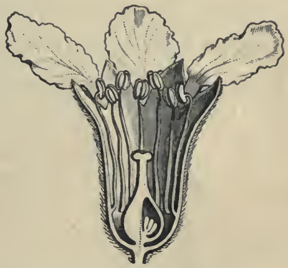

Fig. 411. Long. sect. of flower.

Lafoensia has the same mode of placentation as *Pemphis*; for the two (incomplete) cells of the stipitate ovary have each a basilar placenta, charged with erect ovules. But the flowers are 8–12-merous, with as many accessory tongues as sepals, and a larger, nearly campanulate receptacle. The fruit is a thick capsule, with seeds bordered by a wing. They are woody plants of tropical America, with opposite leaves and beautiful flowers solitary or united in terminal clusters, composed of cymes. *Physocalymma* has very analogous flowers, but with eight parts and twenty-four stamens, without tongues. The fruit is incompletely unilocular, with four multiovulate placentæ united in a basilar mass. The name of the genus is derived from the receptacular sac growing and persisting around the fruit after floration. *P. florida* is a fine Brazilian tree with opposite leaves and the inflorescence of *Lagerstrœmia*. *Diplusodon* is from the same country; it much resembles *Lafoensia* and

Phycosalymma; the flowers are hexamerous, with six tongues alternating with the sepals, a 12-androus andrœcium or formed of an indefinite number of stamens, a sessile ovary, a non-accrescent receptacle. The inflorescence is that of *Lafoensa*.

II. CRYPTERONIA SERIES.

Crypteronia[1] (fig. 412–415), referred by authors to various other groups,[2] appears to comprise somewhat abnormal *Lythrariaceæ*, whose flowers are regular and polygamo-diœcious. The hermaphrodite flowers (fig. 412, 413) have a cup-shaped receptacle, the margin of which bears five[3] sepals and five perigynous stamens, alternating. Each is formed of a filament incurved in the bud, surmounted by a basifixed anther, united below by a glandular connective, dehiscing superiorly by a longitudinal cleft, marginal or more or less introrse. The gynæcium is composed of an ovary in greater part superior, with two or more rarely three cells (fig. 413), complete or incomplete, surmounted by a style with stigmatiferous extremity, slightly enlarged at the top. In the internal angle of each cell, sometimes near its exterior wall, sometimes more or less near the base, is a placenta[4] bearing a great number of anatropous, transverse (fig. 415) or more or less ascending (fig. 413) ovules. In the female flowers, the gynæcium being the same, the stamens have sterile anthers. In the male flowers (fig. 414, 415), the receptacle is less

Crypteronia javanica.

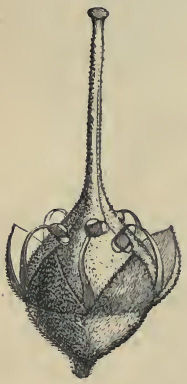

Fig. 412. Hermaphrodite flower ($\frac{6}{1}$).

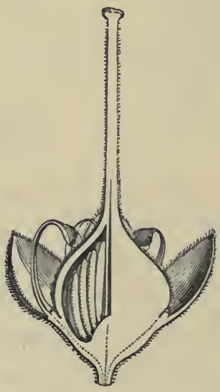

Fig. 413. Long. sect. of hermaphrodite flower.

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[1] Bl. *Bijdr.* 1151; *Mus. Lugd.-Bat.* 123, t. 42. —Endl. *Gen.* n. 5756.—B. H. *Gen.* 783, n. 22. —*Henslowia* Wall. *Pl. As. Rar.* iii. 13, t. 221 (not Bl.).—Endl. *Gen.* n. 1905.—Lindl. *Veg. Kingd.* (1846) 570.—Hook. *Fl. Ind.* ii. 573.— *Quilamum* Blanc. *Fl. d. Filipp.* 851.

[2] Especially to the *Rhamnaceæ* (Endl.), to the *Salicineæ*, and to the *Saxifragaceæ*.

[3] There are also, here and there, tetramerous flowers.

[4] It recalls, by its organization, that of some *Saxifragaceæ-Cunonieæ* with ovarian cells complete or nearly so.

concave than in the female of hermaphrodite flowers; and the gynæcium, reduced to small dimensions, has, nevertheless, an ovary, with two parietal placentas with sterile ovules at the margin, and a short style not stigmatiferous at its enlarged summit. The fruit clothed at the base with the persistent receptacle and calyx, is a globular loculicidal capsule with two, more rarely three cells, and valves united above by the persistent style, charged at the middle of their internal surface or base with numerous narrow, elongate seeds, with soft external coat, attenuated at both extremities to a point or wing, and containing under a thin layer of albumen a fleshy embryo, with thick cylindrical radicle. *Crypteronia* comprises trees or shrubs from the warm regions of India, Malaya, and the Philippine Isles. In the four or five species known,[1] the leaves are opposite, petiolate, without stipules, simple and entire. The flowers, small and numerous, are in simple axillary or ramified terminal clusters.

Crypteronia leptostachya.

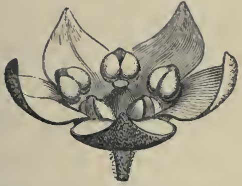

Fig. 414. Male flower ($\frac{8}{1}$).

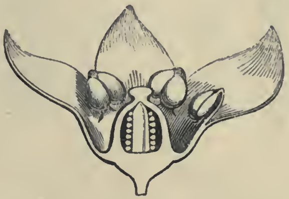

Fig. 415. Loug. sect. of male flower.

With doubt we here provisionally place *Psiloxylon*,[2] sometimes referred to the *Myrtaceæ*. It has polygamous or diœcious flowers. In the male flower the receptacle is in the form of a shallow cup, bearing on its margin five or six sepals, at first imbricate, and an equal number of perigynous petals which fall early. At the same level are inserted ten stamens, five of which are superposed to the petals and five alternate, with free filaments, and bilocular introrse anthers. The gynæcium is sterile though it has distinct cells, placentas and ovules; but the latter are very small and imperfect. In the female flower, in which the stamens are reduced to staminodes, the gynæcium is fertile; the ovary, sessile or very shortly stipitate, is surmounted by a style almost immediately divided into three or four elongate lobes, in the form of thick, flat, fleshy strips, obtuse at the summit, expanded, then reflexed on the top of the ovary; all their upper surface is covered with fine stigmatic papillæ. In each of the three or four (complete or sometimes rather incomplete) cells of the ovary, there is an axile and multiovulate placenta. The fruit is a small berry nearly globular, accompanied at its base by the calyx, and the numerous seeds it encloses have a large fleshy embryo. The only species[1] of this genus is a shrub of the Mascarene Isles, the leaves of which, analogous to those of some Bixaceæ of the *Flacourtia* series, are alternate, entire, penninerved, thick, covered with fine glandular punctuations; the flowers, unattractive, a little larger than those of *Crypteronia* (fig. 416, 417), are grouped in the axil of the leaves, in compound clusters of cymes.

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[1] Pl. *Hook. Journ.* iv. 475, t. 16 (*Henslowia*).—Miq. *Fl. Ind. Bat.* i. p. i. 715 (*Henslovia*).—Walp. *Ann.* iv. 692.

[2] Dup.-Th. ex Gaudich. *Freycin. Voy. Bot.* 30.—Endl. *Gen.* 1205.—Tul. *Ann. Sc. Nat.* sér. 4, vi. 138.—H. Bn. *Adansonia*, x. 39.—Baker, *Fl. Maurit.* 101.—*Fropiera* Hook. f. *Journ. Linn. Soc.* v. 1, t. 1: *Gen.* 725, n. 76.

Psiloxylon mauritianum.

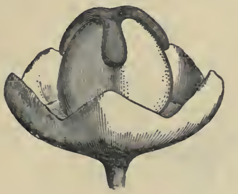

Fig. 416. Young female flower.

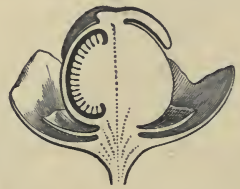

Fig. 417. Long. sect. of young female flower.

III. AMMANNIA SERIES.

Ammannia[2] (fig. 418–424) has given its name to a small series of this family, distinguished (somewhat artificially) by the smallness of their flowers, concave receptacle, generally smooth externally, petals none or scarcely perceptible and by their organs of vegetation. They are small herbs, often aquatic, having ordinarily the habit of *Portulaca*, or *Callitriche*, or *Myriophyllum*, etc. In an indigenous species commonly known as *Peplis*[3] *Portula*[4] (fig. 418, 419) the flowers are pentamerous or more generally hexamerous. The subcampanulate receptacle, thin and membranous, is marginally continuous with the six triangular valvate lobes of the calyx, glandular at the summit; in the intervals are an equal number of accessory teeth, the origin of which is the same as in *Salicaria*. To these teeth correspond an equal number of small obtuse very caducous petals, which are sometimes entirely absent. Much lower, on the internal surface of the receptacle, are inserted six alternipetalous perigynous stamens formed, each, of an enclosed filament and a bilocular, introrse, didymous anther, dehiscing by two longitudinal clefts. The gynæcium is free, formed of an enclosed two-celled ovary, surmounted by a short style with capitate stigmatiferous apex. In the internal angle of each cell is a placenta supporting an indefinite number of anatropous ovules. The fruit, enclosed in the persistent receptacle, is a membranous and polyspermous capsule, the seeds of which contain, under their thick coats, a fleshy embryo, with oval cotyledons and short radicle. In southern Russia there is a *Peplis* called *P. borysthenica*,[1] which differs from *P. portula* only in the greater length of its style. A genus has been made of it under the name of *Middendorffia*.[2] Another *Peplis*, in the United States, *P. diandra*,[3] type of the genus *Didiplis*,[4] is quite similar to our *P.*

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[1] *P. mauritianum.* — *Fropiera mauritiana* Hook. f. *loc. cit.*

[2] Houst. ex L. *Gen.* n. 155.—Adans. *Fam. des Pl.* ii. 234.—J. *Gen.* 333.—Lamk. *Dict.* i. 130; Suppl. i. 328; *Ill.* t. 77.—DC. *Mém. Genèv.* iii. p. ii. 79; *Prodr.* iii. 77.—Endl. *Gen.* n. 6146.—B. H. *Gen.* 776, n. 1.—Baker, *Fl. Maurit.* 99.—H. Bn. *Payer Fam. Nat.* 354 (incl.: *Amanella* Miq. *Ameletia* DC. *Cornelia* Arduin. *Cryptotheca* Bl. *Didiplis* Rafin. *Ditheca* Wight and Arn. *Middendorfia* Trautv. *Nimmoia* Wight, *Peplis* L. *Rotala* L. *Sellowia* Roth. *Suffrenia* Bellard. *Tritheca* Wight and Arn. *Winterlia* Spreng.).

[3] L. *Gen.* n. 446.—J. *Gen.* 333.—Schkuhr. *Handb.* t. 99.—Gærtn. *Fruct.* i. 237, t. 51.—DC. *Prodr.* iii. 76.—Endl. *Gen.* n. 6144.—B. H. *Gen.* 776, n. 2.—H. Bn. *Bull. Soc. Linn. Par.* 87.

[4] L. *Spec.* 474.—DC. *Prodr.* iii. 77.

Ammannia (*Peplis*) *portula.*

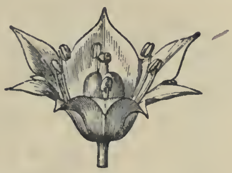
Fig. 418. Flower ($\frac{5}{1}$).

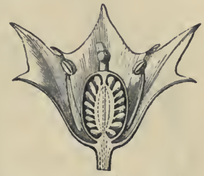
Fig. 419. Long. sect. of flower.

Ammannia (*Suffrenia*) *filiformis.*

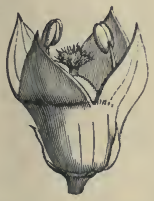
Fig. 420. Flower ($\frac{4}{1}$).

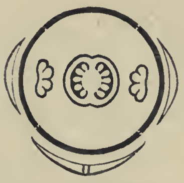
Fig. 421. Diagram.

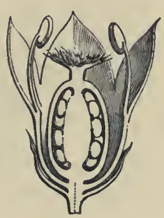
Fig. 422. Long. sect. of flower.

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[1] Bess. ex Spreng. *Syst.* ii. 135.—*Ammania borysthenica* DC. *Prodr.* iii. 78, n. 10.

[2] Trautv. *Diss. de* Middendorffia, *Mém. Sav. étr. Ac. Petersb.* iv. 489, t. 4.—Walp. *Rep.* v. 673.

[3] Nutt. ex DC. *Prodr.* iii. 77, n. 4.—*Ptolina aquatica* Nutt. (ex DC.).

[4] Rafin. *Atlant. Journ.* (1833) n. 6, p. 23.—Endl. *Gen.* 1427.—B. H. *Gen.* 777, n. 3.—*Hypobrichia* M. O. Curt. *Torr. et Gr. Fl. N.-Amer.* i. 479.

portula, but has generally a tetramerous and tetrandrous flower.[1] The true Ammannias, more confined to the warm regions of both worlds, often have the tetramerous flower of *Didiplis*, with or without petals and with the accessory teeth of the calyx more or less developed. In some cases the flower has as many as seven parts; in others again, there are only three, as in *Rotala*[2] (fig. 423, 424). The length of the style varies much also between one species and another. The stamens may be the same in number as the sepals or double, or even less in number. *Suffrenia* (fig. 420–422), like *Didiplis*, may have only two stamens; and the petals, when they exist, are either very small or moderately developed. The dry fruit may open regularly, like every septicidal or septifragal capsule: this is the case in *Rotala*, *Saffrenia*, and *Ameletia*;[3] but it may also open transversely or irregularly, as in *Didiplis* and *Cryptotheca*.[4] It is on these variations that the three[5] sections we admit in the genus *Ammannia* are founded. This genus comprises about thirty-five species,[6] annuals or evergreens, often aquatic, with opposite or verticillate, rarely alternate leaves, axillary solitary flowers, accompanied by lateral bracteoles which are fertile when the flowers are collected in cymes or few-flowered glomerules.

Ammannia (*Rotala*) *verticillaris.*

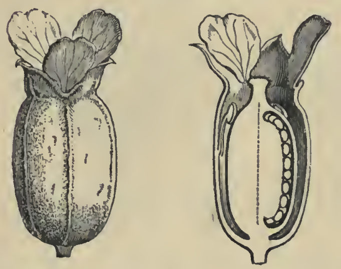

Fig. 423. Flower ($\frac{5}{1}$). Fig. 424. Long. sect. of flower.

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[1] It may be diandrous. The sepals are sometimes five or six in number. The petals are wanting, as is often the case in *Peplis Portula*, and the accessory teeth of the calyx are as marked as in the latter.

[2] L. *Mantiss.* 175.—DC. *Prodr.* iii. 75.—A. S.-H. *Mém. Mus.* ii. 381.—Endl. *Gen.* n. 6143. —? *Ortegioides* Soland. (ex Endl.).—*Entelia* R. Br. (ex Endl.).—*Tritheca* Wight and Arn. *Prodr.* i. 305.

[3] DC. *Mém. Genèv.* iii. p. ii. 82, t. 3; *Prodr.* iii. 76.—Endl. *Gen.* n. 6145.—*Ditheca* Wight and Arn. *Prodr.* i. 304.—*Hapalocarpum* Wight and Arn. *loc. cit.* 305.—*Amanella* Miq. *Fl. Ind.-Bat.* i. p. i. 618.

[4] Bl. *Bijdr.* 1128.—DC. *Prodr.* iii. 76.—Endl. *Gen.* n. 6141.

[5] Bentham and Hooker admit two: one in which the flowers are pedicellate with capsule opening transversely or irregularly; the other in which the flowers are solitary, sessile, with a valvicide fruit. We add a third section *Peplis* (including *Didiplis*).

[6] Roxb. *Pl. Corom.* t. 133.—Bl. *Mus. Lugd.-Bat.* ii. 129, t. 44 (*Cryptotheca*), 135, t. 46, 47; 136 (*Rotala*). — Ledeb. *Ic. Fl. Ross.* t. 391 (*Peplis*).—Wight, *Madr. Journ. Sc.* vii. 312, t. 20 (*Nimmoia*); *Icon.* t. 217, 260 (*Rotala*).—Roth, *Nov. Sp.* 162 (*Sellowia*).—Spreng. *Syst.* i. 519 (*Winterlia*).—Bellard. *Act. Taur.* vii. 445, t. 1. fig. 1 (*Suffrenia*).—Harv. *Thes. Cap.* ii. t. 189 (*Suffrenia*).—Harv. and Sond. *Fl. Cap.* ii. 515.—Griseb. *Fl. Brit. W.-Ind.* 270.—Thw. *Enum. Pl. Zeyl.* 121, 122 (*Ameletia*, *Rotala*).—Miq. *Fl. Ind.-Bat.* i. p. i. 614 (*Tritheca*, *Rotala*), 615 (*Ditheca*, *Suffrenia*), 616 (*Ameletia*), 617

Rhyacophila[1] differs very little from *Ammannia*. The flower is tetramerous and tetrandrous, with four petals, inserted in the hollows between the sepals. In *R. repens*,[2] an Abyssinian species, the petals are small, and the dimerous gynæcium, analogous to that of *Ammannia*, is surrounded by a very small annular disk, with very slightly marked lobes. In the Indian species, *R. Wallichii*, of which the genus *Hydrolythrum*[3] has been made, the petals are larger, exserted, and the lobes of the hypogynous disk, eight in number, are much more distinct. These differences, otherwise of little importance, serve to distinguish two sections in this genus, which is composed of aquatic herbs, like *Myriophyllum*, which they resemble in habit, submerged, verticillate, linear leaves, with flowers in terminal clusters, and accompanied each by two lateral bracteoles which may be more or less raised on their pedicel.

Adanson[4] clearly pointed out, in 1763, in what respects the *Salicaria* family resembled the Myrtle, differing from it in the situation of the gynæcium. He even placed in it *Bæckea*, of the *Myrtaceæ*. A. L. de Jussieu[5] republished the family nearly as Adanson conceived it, adding *Acisanthera*, of the *Melastomaceæ*, and *Glaux*, of the *Primulaceæ*. Later[6] he substituted for the name *Salicariæ*[7] that of *Lythrarieæ*.[8] A. P. de Candolle[9] included in it twenty-seven genera, of which only thirteen are now retained as distinct. Lindley[10] first gave the name *Lythraceæ*. Bentham and Hooker,[11] resuming the name *Lythrarieæ*, admit thirty genera in this group, four of which are abnormal, viz. *Punica*, which we have restored to the *Myrtaceæ*;[12] *Axinandra*, which we consider rather

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(*Hapalocarpum*).—Hiern, *Oliv. Fl. Trop. Afr.* ii. 466 (*Rotala*), 476.—Benth. *Fl. Austral.* iii. 295.—A. Gray, *Man.* ed. 5, 182.—Boiss. *Fl. Or.* ii. 742.—Gren. et Godr. *Fl. de Fr.* i. 597 (*Peplis*).—Walp. *Rep.* ii. 101, 916; *Ann.* i. 294 (*Peplis*); ii. 538; iv. 685 (*Cryptotheca, Peplis*), 686 (*Ameletia*).

[1] Hochst. *Flora* (1841) 659.—*Quartinia* Endl. *Gen.* Suppl. ii. (1842) 94.—B. H. *Gen.* 777, n. 5.

[2] Hochst. *loc. cit.*—Hiern, *Oliv. Fl. Trop. Afr.* ii. 470.—*Quartinia turfosa* A. Rich. *Fl. Abyss. Tent.* i. 277, t. 51.—*Q. repens*, Endl.—Walp. *Ann.* v. 673.

[3] Hook. f. *B. H. Gen.* 777, n. 4.—Hook. *Fl. Ind.* ii. 571.

[4] *Fam. des Pl.* ii. 232, Fam. 31.

[5] *Gen.* (1789) 330, Ord. 9.

[6] *Dict. Sc. Nat.* xxvii. 453.

[7] *Calycanthemæ* Vent. *Tabl.* iii. 298.—*Salicarinæ* Link, *Enum.* i. 142.

[8] Endl. *Gen.* 1198, Ord. 267.

[9] *Mém. Soc. d'Hist. Nat. Genève*, iii. p. ii. 65; *Prodr.* iii. 75, Ord. 74 (1828).

[10] *Introd.* ed. 2, 100; *Veg. Kingd.* (1846) 574, Ord. 918.

[11] *Gen.* 773, 1007, Ord. 69.

[12] See pp. 333, 337, 338, 381. The ovary is not free at the bottom of the receptacle.

anomalous *Melastomaceæ*;[1] *Olinia*,[2] which we have made a series of *Rhamnaceæ*,[3] and *Heteropyxis*,[4] quite unknown to us. We have, moreover, enumerated *Sonneratia* among the *Myrtaceæ*, and *Strephonema* among the doubtful *Rosaceæ*.[5] By considering *Hydrolythrum* as simply a section of the genus *Rhyacophila*, and including *Peplis* and *Didiplis* in the genus *Ammannia*,[6] we have reduced the number

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[1] Notwithstanding their alternate leaves, because, as we shall see, the stamens are fundamentally constructed like those of this group.

[2] Thunb. *Rœm. Arch.* ii. p. i. 5; *Fl. Cap.* 194.—DC. *Prodr.* ii. 41.—Endl. *Gen.* n. 6272.—B. H. *Gen.* 785, n. 29.—*Crematostemon* hort. (ex Endl.). This genus has been placed in different families, particularly in the series of *Melastomaceæ*, of *Lythrariaceæ*, and it has also been considered (Arnott,—Naudin) as the type of quite a distinct family.

[3] *Bull. Soc. Linn. Par.* (1876) 90. We have seen in tracing the development of the flowers of this genus (fig. 425, 426), that they have a hollow tubular receptacle, to the bottom of which the ovary is adnate, and at the upper orifice of which are inserted four or five coloured sepals, as many small alternate petals, superposed to which are an equal number of stamens, with short bilocular introrse anthers, surmounted by a glandular connective. The cells of the inferior ovary, 3–5 in number, contain each 2 or 3 ascending ovules with micropyle exterior and inferior. Decaisne (*Tr. Gen. Botan.* 292) has described and figured the ovules as pendant, a grave error. The fruit is drupaceous, and the putamen encloses a seed with exalbuminous embryo, and the cotyledons are said to be unequally convolute. It is by this character especially that the *Olinieæ* are distinguished as a tribe or series in the family of *Rhamnaceæ*, where we propose to place them. The short collarette, entire or obscurely lobed, found outside the perianth and often described as a calyx, is only a discoid prolongation of the receptacular tube, the formation of which is tardy. *Olinia* consists of Cape shrubs, with opposite coriaceous leaves, and flowers collected in trichotomous cymes. There is probably only one species, *O. cymosa* Thunb.—Harv. and Sond. *Fl. Cap.* ii. 520.—*O. capensis* Link, Kl. et Ott. *Ic. Pl. Rar.* i. 6, t. 3.—*O. acuminata* Link, Kl. et Ott. *loc. cit.* 53, t. 21.—*Syderoxylon cymosum* L. f. *Suppl.* 152.—*Crematostemon capense* hort.

Olinia cymosa.

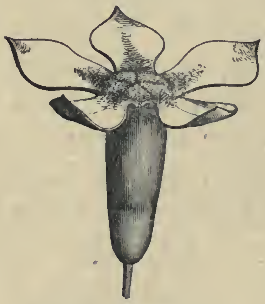

Fig. 425. Flower ($\frac{4}{1}$).

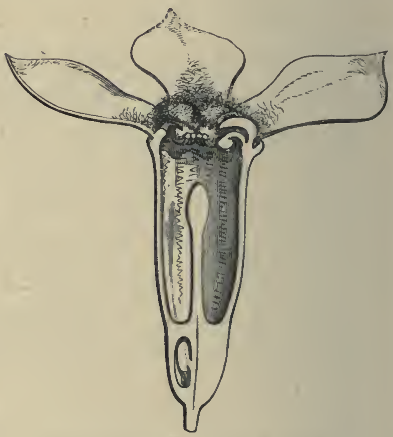

Fig. 426. Long. sect. of flower ($\frac{8}{1}$).

[4] Harv. *Thes. Cap.* ii. 18, t. 128.—B. H. *Gen.* 785, n. 30. This genus, placed among the anomalous *Lythrarieæ*, with inferior ovary, is especially characterized by an imbricate calyx, with five lobes, petals with glandular punctuations, oppositipetalous stamens and alternate leaves. Its fruit is capsular; the ovarian cells multiovulate. This plant, figured by Harvey with poorly developed stamens and an imperfect ovary, is quite unknown to us.

[5] See vol. i. 424, 479.

[6] *Bull. Soc. Linn. Par.* (1876) 87.

of generic groups[1] to twenty-two. The number of species is estimated at about two hundred and fifty.

The geographical distribution is very extended. *Cuphea*, entirely American, comprises more than a third of the species of the family. *Lythrum* and *Ammannia*, each giving a name to a series, are spread over a very vast area, in the new as well as in the old world, in tropical as well as in temperate regions. *Peplis portula*, in the north of Europe, corresponds to *Ammannia*, found in North America, Australia, and the Cape of Good Hope. *Salicaria* from Lapland and the north of Asia to Tasmania, the Cape, and southern Chili. Ten genera are exclusively American, and three are common to America and the old continent. *Pemphis*, represented by a single species, conforms to the litoral plants which resemble it; it is met with in a great part of tropical Oceania and Asia. *Lawsonia*, supposed to be a native of the north-east of Africa and of India, has been introduced into many tropical countries. Most of the old world genera are limited to a few countries. *Tetrataxis* belongs exclusively to Mauritius, *Psiloxylon* to the Mascarene isles, *Crypteronia* to Malaya and the Philippines. *Rhyacophila* and *Woodfordia* are common to central Asia and eastern Africa.

The characters absolutely constant in this family are very few. The concavity of the receptacle of little thickness but very deep, the perigynous insertion of the corolla, when it exists, and especially the independence of the gynæcium situated at the bottom of the receptacular cavity, are about all that can be mentioned. By the last the *Lythrariaceæ* are distinguished from the *Myrtaceæ* and *Onagrariaceæ*, to which they are allied by all other characters, and which, in all normal types, have, as is said, "the ovary adherent." The *Rhizophoraceæ* with free ovary, that is the *Macarisieæ*, are in this respect nearer the *Lythrariaceæ* with which several of them have been confounded;[2] but in the latter, the ovules in each cell are indefinite in number, and the *Lythrariaceæ* have not the intra-axillary stipules of *Macarisieæ*. The *Melastomaceæ* are also near neighbours of the *Lythrariaceæ*; but the latter have not the characteristic anthers of the former. There are, moreover, in the *Lythrariaceæ*, some characters which, though not constant, are very frequent. These are: the opposition of the leaves, the thinness of the receptacle and of the disk, which is often even wanting, the consistence of the pericarp, often dry, thin and dehiscent, and the absence of albumen in the seeds. Other characters, less important and still more variable, are: the number of parts of the flower and of the andrœcium, the presence of striæ or ribs on the receptacle, the mode of imbrication or corrugation of the petals, the direction straight or curved of the floral tube, the situation of the placentas in the internal angle or at the base of the cells, the form of the fruit at maturity, naked or enveloped by the sac formed by the receptacle. On these variations are based the following series, very artificial doubtless, admissible in this family:

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[1] Without counting the genus *Physopodium* of DESVAUX (*Ann. Sc. Nat.* sér. 1, ix. 403) generally enumerated in the *Lythrariaceæ* (DC. *Prodr.* iii. 94;—ENDL. *Gen.* n. 6168), the place of which is not determinable, the characters of the gynæcium and of the fruit not being given with precision. *P. volubile*, a climbing shrub of Bourbon, is perhaps a *Combretaceæ*; we have been unable to discover it in the herbarium of DESVAUX.

[2] Especially *Symmetria* BL. which is a *Barraldeia* and *Tomostylis* MONTROUS. (*Mém. Acad.*

I. Lythreæ.—Trees or shrubs, with regular or irregular generally hermaphrodite flowers, receptacle elongated to a tube or in form of a large cup, coriaceous or herbaceous, with longitudinal ribs or striæ. Petals ordinarily developed, corrugate, of large size like the flowers themselves.—18 genera.

II. Crypteronieæ.—Trees or shrubs, with regular, polygamous, diœcious flowers, petals none or but little developed, not corrugate, receptacle a shallow cup, smooth and rather thick. Fruit free.—2 genera.

III. Ammannieæ.—Herbaceous plants, generally small, creeping, often aquatic. Flowers scarcely visible, petals none or small flat. Receptacle membranous, without striæ or ribs.—2 genera.

Uses.—Most authors remark, with reason, that the properties of the *Lythrariaceæ*, often imperfectly determined, are extremely variable. Some are astringent and contain tannin; others resinous matter; others again, irritant, vesicant, purgative, vomitive, or diuretic substances. Some contain a colouring principle; the flowers

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Lyon, x. 201), given by the author as a new genus of *Lythrariaceæ*, and which appears to be a *Crossostylis*. *Pokornya* of the same author (*Mém. Acad. Sc. Lyon*, x. 201), referred also to the *Lythrariaceæ*, is evidently (B. H. *Gen.* 776) a *Combretacea*, *Lumnitzera racemosa* W.

[1] Endl. *Enchirid.* 644.—Lindl. *Veg. Kingd.* 575; *Fl. Med.* 150.—Rosenth. *Synops. Plant. Diaphor.* 910.

may have an agreeable or offensive odour. The common *Salicaria*[1] (fig. 386–392) so common at the waterside and in so many countries, had formerly a certain reputation as an astringent, antidysenteric medicine; the root was more especially sought. A neighbouring species, *Lythrum hyssopifolium*,[2] was formerly considered a vulnerary, anti-scorbutic, and aperitive. *L. alatum*,[3] of the United States, is employed in the treatment of sores and ulcers. Several American *Nesœas* are extolled as medicines. *N. verticillata*,[4] growing in marshes, is reputed to cure abortion in animals which feed upon it. *N. syphilitica*,[5] to which the Mexicans attribute many properties, has a diuretic, sudorific, and laxative juice. There is also in Peru a *Cuphea antisyphilitica*,[6] and *C. microphylla*[7] is reputed to have the same virtues. There are likewise in this genus many plants with a viscous tenaceous juice, secreted by numerous glands on the surface of the stems and leaves. The *Ammannia* have sometimes insipid, slightly fleshy leaves, used for the same purposes as purslain, but it would be imprudent to eat them raw. Such is *A. portula*[8] (fig. 418, 419), considered edible in some countries.[9] *A. vesicatoria*,[10] on the contrary, is an acrid plant, of a strong chloric odour; its leaves are preferred, in India, to cantharides, as producing a more rapid and less painful vesication. The *Lagerstrœmias* are magnificent ornamental plants, often cultivated in the open air in gardens in the south of Europe. *L. indica*[1] (fig. 405, 406) is the most remarkable for its numerous varieties with pink or lilac flowers. *L. Reginæ*[2] is scarcely less esteemed in India. It is also a medicinal plant. Its roots are astringent and useful in the treatment of aphthæ. Purgative, drastic, and hydrogoguic decoctions are prepared from its bark, its leaves, and its flowers. The seeds are considered narcotic. From the bark of *L. hirsuta*[3] are prepared dissolvent and resolutive plasters applied to sores. *Woodfordia floribunda*, an Asiatic and African species, is cultivated in our conservatories, where it thrives well. In India a yellow dye is extracted from its flowers. The most renowned of the *Lythrariaceæ* as a tinctorial plant is *Lawsonia inermis*[4] (fig. 407–409), believed to be a native of the north-east of Africa, and is cultivated in the east of Africa and all the west of Asia. Its numerous leaves are said to have a strong odour,[5] and from its leaves is prepared the reddish-yellow colour with which oriental ladies daub their hair, their eyelids, and especially the nails of their hands and feet. It is also a medicine recommended for wounds, icterus, ringworm, leprosy, aphthæ;[6] it is rarely cultivated in our conservatories. Many *Cupheas* with brilliant flowers may be seen in our gardens, cultivated in masses and in borders, and some subshrubby American *Nesæas*. There are also some *Salicarias* which are somewhat ornamental. In Brazil *Physocalymma*,[7] *Diptusodon*, and *Lafoensia*, are remarkable for the beauty of their flowers, and scarcely yield in this respect to *Lagerstrœmia* in the old world.

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[1] *Lythrum Salicaria* L. *Spec.* 640.—DC. *Prodr.* iii. 82, n. 13.—Gren. et Godr. *Fl. de Fr.* i. 593. —Caz. *Pl. Méd. Indig.* ed. 3, 945.—*Salicaria spicata* Lamk, *Fl. Franç.* iii. 103.—*S. vulgaris* Mœnch, *Meth.* 665.—*Lysimachia purpurea quibusdam spicata* J. Bauh. (*Red Lysimachia*).

[2] L. *Spec.* 642.—Rosenth. *op. cit.* 912.—*Salicaria hyssopifolia* Lamk.

[3] Pursh, *Fl. Bor.-Amer.* i. 334 (not Presl). —DC. *Prodr.* n. 5.—Ell. *Bot. Mag.* t. 1812.—*L. vulneraria* Schr. *Pl. Rar. Hort. Mon.* t. 27.—*L. acinifolium* Sess. et Moç. (ex DC.).—*L. Kennedyanum* H. B. K. *Nov. Gen. et Sp.* vi. 194. —*L. virginicum* Kenn.—*Pythagorea alata* Rafin. (*Yerba del cancer*). *L. Hunteri* DC. mingled with *Morinda*, is used in India for dyeing.

[4] H. B. K. ex Rosenth. *op. cit.* 914.—*Lythrum verticillatum* L.

[5] H. B. K. ex Rosenth. *op. cit.* 911.—*Heimia syphilitica* DC. *Prodr.* iii. 89.—*Gynoria syphilitica* Moç. et Sess. ex DC. *loc. cit.* (*Hanchinol*). *N. salicifolia* H. B. K. *Nov. Gen. et Sp.* vi. 192 (*Heimia salicifolia* Link et Ott.), from the same country (fig. 394, 395), has analogous properties.

[6] H. B. K. *Nov. Gen. et Sp.* vi. 202.—DC. *Prodr.* iii. 87, n. 30 (*Chiagari*). *C. Balsamona* Cham. and Schlchtl and *ingrata* Cham. and Schlchtl, of Brazil (*Sete Sangrias*), are reputed antisyphilitic and febrifuge.

[7] H. B. K. *Nov. Gen. et Sp.* vi. 201.—DC. *Prodr.* n. 28. *C. Apanxalon* DC. is considered astringent in Mexico, and from *C. lanceolata* Ait. (*Atlanchan*) a tincture is prepared with which the abdomen of women in childbirth is rubbed.

[8] H. Bn. *Bull. Soc. Linn. Par.* (1876) 88.—*Peplis Portula* L. *Spec.* 474.—Schkuhr, *Handb.* t. 99.—DC. *Prodr.* iii. 77, n. 1.—Gren. et Godr. *Fl. de Fr.* i. 597.—*Portula diffusa* Mœnch. *A. verticillaris* (*Rotala verticillaris* L.;—DC. *Prodr.* iii. 76) used in India in the treatment of abscesses.

[9] On the coasts where *Pemphis acidula* Forst. (fig. 410, 411) grows, its slightly fleshy and salt leaves are eaten as salad.

[10] Roxb. *Fl. Ind.* i. 447.—DC. *Prodr.* iii. 78, n. 7.—Lindl. *Fl. Med.* 149.—Rosenth. *op. cit.* 911.—*A. baccifera* L.?—*Hapalocarpum vesicatorium* Wight and Arn. (*Daud-maree* of the Bengalese).

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[1] L. *Spec.* 784.—DC. *Prodr.* iii. 93, n. 1.—Curt. *Bot. Mag.* t. 405. — *Sibi*, *Fakusinda* Kæmpf. *Amœn. Exot.* 855.

[2] Roxb. *Pl. Coromb.* i. 46, t. 65.—DC. *Prodr.* n. 5.—Rosenth. *op. cit.* 913.—*Adambea glabra* Lamk. *Dict.* i. 39.

[3] W. *Spec.* iii. 1178.—DC. *Prodr.* n. 6.—*Adambea hirsuta* Lamk. *loc. cit.* n. 2.

[4] L. *Spec.* 498.—Desf. *Fl. Atl.* i. 325.—Mér. et Del. *Dict. Mat. Méd.* iv. 78.—Endl. *Enchirid.* 144.—*L. spinosa* L.—*L. alba* Lamk. *Dict.* iii. 106.—*Alcanna* Rumph. *Herb. Amboin.* iv. t. 17 (*Henna*, *Alhenna*, *Cyprus*).

[5] "Penetrating, hircinous."

[6] The juice and extract are employed internally and the leaves locally in the treatment of cutaneous affections (Ainsl. *Mat. Ind.* ii. 190). Belon says that the culture of this shrub in Egypt, which is exported in quantity to Constantinople, is a source of great revenue to the pashas. The leaves are also used for dyeing skins and stuffs. In Egypt the slaves were not allowed to dye with *Henne*. Traces of it are found on the most ancient mummies. In Amboyna, Labillardière (*Voy.* i. 344) has seen this dye used, especially by the Chinese. Avicenne compared the properties of Henné with those of Dragon's Blood. Its roots alone are decidedly astringent. Berthollet always believed the plant did not contain tannin.

[7] *P. florida* Pohl furnishes the Rosewood of Brazil esteemed for superior cabinet work (*Pâo rosa*, *Sebastião d'Arruda*).

GENERA.

1. **Lythrum** L.—Flowers hermaphrodite regular or sometimes irregular; receptacle straight cylindrical, thin submembranous, externally longitudinally 8–12-costate, lined with very thin disk, a little thicker at base and apex, often subnil, equal at base, not spurred or gibbous. Sepals 4–6, inserted at top of tube, 3-angular, valvate; accessory teeth same in number smaller alternating with petals erect or oftener patent. Petals 4–6, alternating with sepals and inserted in the intervals, shortly or scarcely unguiculate; equal or rarely (*Anisotes*) unequal; the 2 superior larger; imbricate, corrugate (sometimes 0). Stamens rarely 5, 6 (*Anisotes*), most frequently double the number of petals, inserted 2-seriately in tube of receptacle; the oppositipetalous shorter or sometimes sterile imperfect; filaments erect; anthers basifixed, enclosed or exserted, introrse, 2-rimose. Germen sessile, free at bottom of receptacular tube; disk very small (or 0); style terminal short or elongate slender, apex stigmatose obtuse or capitate hardly 2-lobed. Ovules in 2 (complete or incomplete) cells ∞, anatropous, 2–∞-seriately ascending. Fruit enclosed in receptacular tube, oblong, membranous, 2-locular or, from incomplete septum, 1-locular, septicidally 2-valvate or opening irregularly; placentas finally subfree. Seeds ∞, angular or plano-convex smooth; cotyledons of exalbuminous embryo thick obcordate, 2-auriculate at base; radicle short conical inferior.—Herbs or more rarely small shrubs, glabrous or tomentose; branches 4-gonal or subulate; leaves opposite or verticillate, sometimes alternate, oblong or linear entire; flowers axillary, solitary or oftener in racemes and terminal rarely ramose bracteate glomeruliferous spikes. (*All temp. regions.*)—See p. 429.

2. **Pleurophora** Don.[1]—Flowers nearly of *Lythrum*; tube of receptacle subcylindrical. Sepals 5–7, equal, valvate; accessory teeth same in number alternate short or spinescent. Petals same in number oblong, unguiculate. Stamens 5–14, more rarely 15–20, inserted at bottom of receptacular tube; filaments finally exserted;

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[1] *Edinb. New Phil. Journ.* xii. 112.—Endl. *Gen.* n. 6150.—B. H. *Gen.* 779, n. 11.

anthers short, 2-dymous. Germen free, shortly stipate hence eccentrically inserted a little above the base of the tube, somewhat obliquely compressed, by abortion 1-locular; style slender, at apex stigmatose simple, generally not dilated. Ovules few (often 4), inserted 2-seriately on parietal placenta, ascending; micropyle extrorsely inferior. Fruit capsular membranous, enclosed in receptacle, few-seeded. Seeds 1–4, ascending; testa coriaceous; cotyledons of subclavate embryo plano-convex, auriculate at base; radicle inferior rather thick.—Herbs or shrubs divaricately rimose; leaves opposite, linear or lanceolate, coriaceous rigid, often venose, sharp pointed; flowers spicate; bracts sub-4-seriate, imbricate, oftener 1-florous; bracteoles sometimes rigid, often inserted higher under the flower.[1] (*Chili.*[2])

3. **Nesæa** Commers.[3]—Flowers (nearly of *Lythrum*) regular; receptacle much shorter subcampanulate or obconical straight, externally 8–14-costate; sepals 4–7, 3-angular-valvate; accessory teeth same in number narrower. Petals 4–7 (of *Lythrum*). Stamens 8–14, inserted 2-seriately in receptacular tube; filaments slender exserted; anthers introrse, various in form.[4] Germen free, 2–6-locular; style slender flexuose exserted, at apex stigmatose capitate. Ovules in cells ∞, inserted on placenta in internal angle ∞-seriate. Fruit capsular, enclosed in receptacle, loculicidally 2–6-valvate; valves septiferous, finally solute from placenta. Seeds ∞; testa coriaceous; cotyledons of exalbuminous embryo plano-convex. Other characters of *Lythrum*.—Herbs or undershrubs; branches 4-gonal; leaves opposite or 3-nate; entire; flowers[5] in axils of leaves or bracts inserted in terminal raceme solitary or oftener cymose; peduncles sometimes more or less highly 2-bracteolate.[6] (*Warm America and Africa.*[7])

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[1] A genus scarcely distinguishable from *Lythrum*.

[2] Spec. 3, 4. Coll. *Pl. Chil.* t. 14 (*Lythrum*). Hook. and Arn. *Bot. Misc.* i. 225, t. 3.—Pœpp. et Endl. *Nov. Gen. et Sp.* ii. 67, t. 193.—C. Gay, *Fl. Chil.* ii. 369.—Walp. *Rep.* ii. 105; *Ann.* ii. 540; iv. 689.

[3] Ex J. *Gen.* 332.—DC. *Mém. Soc. Gen.* iii. p. ii. 74; *Prodr.* iii. 90.—Endl. *Gen.* n. 6147.—B. H. *Gen.* 779, n. 12.—H. Bn. *Payer Fam. Nat.* 354.—*Decodon* Gmel. *Syst. Veg.* 677.—DC. *Prodr.* iii. 90.—*Heimia* Link et Ott. *Ic. Pl.* 63, t. 28.—DC. *Prodr.* iii. 89.—Spach, *Suit. à Buffon*, iv. 428.—Baker, *Fl. Maurit.* 100.—*Chrysoliga* W. (ex DC.).—*Ginoria* Sess. et Moç. (ex DC.), not Jacq.—*Tolypeuma* E. Mey. (ex Endl. *loc. cit.*)

[4] Either oblong or 2-dymous. "Pollen (ex H. Mohl, *Ann. Sc. Nat.* sér. 2, iii. 331) ellipsoid 3-plicate, but in water spherical, 3-banded."

[5] Often yellow, sometimes purple or bluish.

[6] Sect. in gen. 3 (B. H.): 1. *Decodon*: stem herbaceous; inflorescence corymbiform, ∞-florous; petals purple; stamens 10 (*North Amer.*).—2. *Heimia*: peduncles 1-florous; bracteoles under calyx 2; petals yellow; stamens oftener 12; stem subshrubby (*Amer. Trop. Afr.*).—3. *Eunesæa*: peduncles 3–∞-florous, 2-bracteate at base; terminal 2-bracteolate; stem herbaceous or subshrubby; flowers purple or sometimes bluish (*Trop. Afr. Malacca*).

[7] Spec. 10–12. Hook. *Icon.* t. 554.—Torr. *Fl New York*, i. t. 28.—Wight, *Icon.* t. 259.—

4. **Ginora** L.[1]—Flowers nearly of *Nesœa*; receptacle turbinate. Sepals 5, 6, ovately acute; accessory teeth 0. Petals corrugately imbricate. Stamens 12–24, inserted in tube of receptacle; filaments corrugate; anthers oblong, reniform or hippocrepiform recurved. Germen short depressed globose; cells oftener 4; style slender, finally erect exserted, at apex stigmatose capitellate. Ovules in cells ∞, inserted in axil of tumid placenta, ascending. Fruit girt at base with calyx, capsular, globose coriaceous, loculicidally 4-valvate. Seeds on tumid placentas ∞, small obovately cuneate; testa thick; cotyledons of exalbuminous embryo plano-convex auriculate; radicle short.—A glabrous shrub; ramules 4-gonal; leaves opposite, entire petiolate; flowers[2] axillary solitary pedunculate; peduncle under flower 2-bracteolate. (*Cuba.*[3])

5. **Dodecas** L.[4]—Flowers nearly of *Ginora*, 4-merous; receptacle obconico-suburceolate, thin. Sepals 4, 3-angular, valvate; accessory teeth hardly perceptible or 0. Petals 4, inserted in hollows, obovate, very thin, corrugate imbricate. Stamens 8–20, inserted at middle of receptacular tube; filaments corrugate-plicate, finally exserted; anthers oblong introrse, finally erect. Germen free, enclosed in receptacle, 4-locular; style slender plicate, presently erect, at apex stigmatose subentire. Ovules in cells ∞, inserted on thick placenta, ∞-seriate. Fruit capsular, finally sub-1-locular; seeds ∞, inserted on spuriously central placenta, ascending, falcate, scobiform; testa hispid, produced on both sides; cotyledons of slightly fleshy embryo plane linear; radicle terete.—Glabrous shrubs or small trees; leaves opposite entire; flowers[5] axillary, solitary or few cymose, 2-parous; pedicels under flower 2-bracteolate. (*Shores of trop. S. America.*[6])

6. **Adenaria** H. B. K.[7]—Flowers nearly of *Ginoria*, 4–5-merous;

Guill. et Perr. *Fl. Seneg. Tent.* i. t. 69, 70.—Griseb. *Fl. Brit. W.-Ind.* 271.—Tul. *Ann. Sc. Nat.* sér. 4, vi. 130.—Hiern, *Oliv. Fl. Trop. Afr.* ii. 470.—Harv. and Sond. *Fl. Cap.* ii. 517.—Walp. *Rep.* ii. 103; v. 674; *Ann.* iv. 688.

[1] *Gen.* n. 605.—B. H. *Gen.* 780, n. 14.—*Ginoria* Jacq. *St. Amer.* t. 91.—J. *Gen.* 331.—DC. *Prodr.* iii. 91.—Endl. *Gen.* n. 6155.—*Genoria* Pers. *Synops.* ii. 9.

[2] Bluish, generally showy.

[3] Spec. 1, 2, of which 1, *G. americana* Jacq. (*Rosa del Rio* incol.) is most known.

[4] *Suppl.* 36, 245.—J. *Gen.* 323.—E. Mey. *Nov. Act. Nat. Cur.* xii. 800.—DC. *Prodr.* iii. 91.—B. H. *Gen.* 780, n. 13.—*Crenea* Aubl. *Guian.* i. 523, t. 209.—Lamk. *Dict.* ii. 177; *Ill.* t. 407.—J. *Gen.* 332.—DC. *Prodr.* iii. 90.—Endl. *Gen.* n. 6153.

[5] White, sometimes rather large.

[6] Spec. 2 (?). G. F. W. Mey. *Prim. Fl. Esseq.* 186.—Griseb. *Fl. Brit. W.-Ind.* 270.—Walp. *Rep.* ii. 112.

[7] *Nov. Gen. et Sp.* vi. 185, t. 549.—DC. *Prodr.* iii. 91.—Endl. *Gen.* n. 6157.—B. H. *Gen.* 777, n. 6.—H. Bn. *Payer Fam. Nat.* 354.

receptacle obconical or subcampanulate. Sepals 4, 5, 3-angular, valvate; accessory teeth 0. Petals 4, 5, inserted in intervals, elongate subspathulate. Stamens 8–10, 2-seriate; the oppositipetalous a little longer; filaments inserted alternately higher on receptacle, or all above the bottom of the receptacle and there connate in a short scarcely prominent ring, finally exserted; anthers oblong; connective sometimes incrassate. Germen inserted at bottom of receptacle, free, very short or rather long stipitate, like the sepals and stamens covered with punctiform glandules, 2-locular; style subcapitate shortly 2-lobed at apex. Ovules in cells (sometimes incomplete above) ∞, inserted ∞-seriately on thick placenta. Fruit capsular, partly or nearly quite enclosed by persistent calyx, finally sub-1-locular; pericarp thin fragile; placenta subfree. Ovules ∞, obcuniate and nearly globular, narrower at base; testa thick hard; cotyledons of somewhat fleshy embryo subplane; radicle short. Glabrous or tomentose trees; branches terete; leaves (with flowers and germens) dark glandular-punctuated, opposite, ovately or oblong-acute membranous penninerved; flowers[1] axillary in umbelliform or corymbiform cymes.[2] (*Trop. Cent. America.*[3])

7. **Grislea** Loefl.[4]—Flowers nearly of *Adenaria* (larger), 4–5-merous; sepals intermixed with as many accessory teeth. Petals 4, 5, rather large or small, sometimes very narrow or 0. Stamens 8–10, inserted around base of gynæcium at bottom of receptacle. Other characters of *Adenaria.*[5] Fruit capsular globose coriaceous, enclosed in receptacle.—A shrub; habit and leaves of *Adenaria*; flowers in axillary subumbelliform cymes; bracts inserted at base of pedicels, subfoliaceous. (*Columbia, Venezuela.*[6])

8. **Woodfordia** Salisb.[7]—Flowers irregular; tube of receptacle oblique at base and mouth, slightly curved. Sepals 5-7, oftener 6, continuous with tube, short, 3-angular, valvate; accessory teeth same in number minute. Petals same in number inserted in hollows, rather large or very small (sometimes 0). Stamens 10–14, declinate, 2-seriate, 5–7 larger, oppositipetalous; filaments free, springing

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[1] Small, white or yellowish.

[2] Habit nearly of *Decodas.*

[3] Spec. 2, 3. Spreng. *Syst. Veg.* ii. 474 (*Antherylium*).—Hook. *Icon.* t. 116.—Walp. *Rep.* ii. 112.

[4] *It.* 245.—L. *Gen.* n. 474.—J. *Gen.* 331.—Lamk. *Dict.* iii. 46; Suppl. ii. 853 (part).—DC. *Prodr.* iii. 92 (part).—Spach, *Suit. à Buffon*, iv. 438.—Endl. *Gen.* n. 6156 (part).—B. H. *Gen.* 778, n. 7.

[5] Rather perhaps a section of *Grislea*, the insertion of the stamens somewhat different.

[6] Spec. 1. *G. secunda* Lœfl. *loc. cit.* –H. B. K. *Nov. Gen. et Sp.* vi. 185.

[7] *Par. Lond.* t. 42.—B. H. *Gen.* 778, n. 8.—Hook. *Fl. Ind.* ii. 572.

from small crown lining base of receptacle, incurved at apex; anthers short, introrsely 2-rimose. Germen enclosed, subglandular at base; cells 2, ∞-ovulate; style at apex stigmatose very minutely 2-lobed. Capsule enclosed in receptacle, oblong membranous, loculicidally 2-valvate. Seeds ∞, small, externally papillosely pilose; embryo, etc., of *Lythrum.*—A ramose shrub, more or less sprinkled with grey hairs and dark glanduliform spots; leaves opposite subsessile entire, white beneath; stipules 2, minute, very caducous; flowers[1] axillary, solitary or oftener cymose or glomerulate; bracts opposite. (*Trop. south-east. Asia, Malacca, trop. east. Africa.*[2])

9. **Cuphea** P. Br.[3]—Flowers irregular; tube of receptacle elongate, 6–12-costate, at posterior base gibbous or spurred. Sepals 6, inserted in oblique mouth of tube, valvate; accessory teeth same in number (or 0). Petals 6 or 4–2 (sometimes 0), subequal or unequal; the posterior larger. Stamens generally 11, 2-seriate; 6 oppositipetalous smaller; 5 alternipetalous; the posterior wanting; filaments unequal (the posterior shorter); anthers small basifixed or sub-2-dymous.[4] Disk around germen short or oftener posteriorly produced to a descending spur-like glandule. Germen sessile, free at bottom of receptacular tube, incompletely 2-locular; posterior cell oftener smaller, sometimes sterile effete; style slender incurved, at apex stigmatose obtuse[5] or capitate, obscurely 2-lobed. Ovules on placenta adnate to septum or more or less free above,[6] ascending;[7] with micropyle extrorsely inferior;[8] either subdefinite (2–4), or often ∞. Fruit enclosed in receptacular tube, straight or oblique, dry, indehiscent, or occasionally dehiscent, generally sub-1-locular. Seeds 1–∞, inserted on spuriously free placenta, ascending, compressed smooth;

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[1] Yellowish-red, nearly of *Cuphea.*

[2] Spec. 1. *W. floribunda* Salisb.—Hiern, *Oliv. Fl. Trop. Afr.* ii. 481.—*Grislea tomentosa* Roxb. *Pl. Corom.* i. 29, t. 31.—DC. *Prodr.* iii. 92, n. 2. —Miq. *Fl. Ind.-Bat.* i. p. i. 620.—Tul. *Ann. Sc. Nat.* sér. 4, vi. 135.—*Bot. Mag.* t. 1906.—*G. punctata* Buchan.—*G. uniflora* A. Rich. *Fl. Abyss. Tent.* i. 281, t. 52.—*G. multiflora* A. Rich. —*G. micropetala* Hochst.

[3] *Jam.* 216.—Jacq *Hort. Vindob.* ii. 83, t. 177. —J. *Gen.* 332.—Poir. *Dict.* vi. 162; Suppl. v. 22; *Ill.* t. 407.—DC. *Prodr.* iii. 83.—Spach, *Suit. à Buffon*, iv. 422.—Endl. *Gen.* n. 6151.—Payer, *Organog.* 477, t. 95.—B. H. *Gen.* 778, n. 9.—H. Bn. *Payer Fam. Nat.* 355.—E. Koehne, *Bot. Zeit.* (1873) 110; (1875) 291.—Barcianu, *Sch. und Luerss. Mit. Ges. d. Bot.* Bd ii. Hft i. 179.—*Melanium* P. Br. *Jam.* 215.—Spreng. *Syst.* ii. 443.—*Parsonsia* P. Br. *op. cit.* 199, t. 21, fig. 2.—*Duvernaya* Desp. (ex Endl.).—*Banksia* Domb. (ex Endl. not R. Br.).—*Balsamona* Vandell. ex *Rœm. Script.* 110.—*Melvilla* Anders. *Journ. Arts and Sc.* (ex Lindl. *Bot. Reg.* t. 852).

[4] Pollen depresso-ellipsoid, 3-plicate, 3-papillose, unchanged in water. (H. Mohl, *Ann. Sc. Nat.* sér. 2, iii. 331).

[5] Sometimes tubular and hollow.

[6] Whence apparently partly free and spuriously central in some species.

[7] Funicles erect unequal; but the upper often more slender and longer.

[8] With double coat.

cotyledons of exalbuminous embryo thick suborbiculate or obcordate, often auriculate at base; radicle inferior short conical or lobed.—Small shrubs, undershrubs, or oftener herbs, sometimes viscous, glandular pilose; branches terete; leaves opposite or verticillate, sometimes alternate, entire penninerved; flowers[1] solitary or racemose; peduncle axillary, lateral or oftener interpetiolate,[2] bracteolate.[3] (*Both trop. and subtrop. Americas.*[4])

10. **Antherylium** Rohr and Vahl.[5]—Flowers nearly of *Grislea*, 4-merous; tube of receptacle obconical. Sepals 4, valvate; accessory teeth 0. Petals 4, oblong, corrugately imbricate. Stamens $12-\infty$, inserted at margin of thin disk lining tube; filaments free slender; anthers curved. Germen free at bottom of receptacle; cells 4, complete or incomplete above, oppositipetalous; style slender flexuose, at apex stigmatose truncate. Ovules in cells ∞, inserted on thick placenta. Fruit capsular, at base stipate with calyx, large nozzled above, membranous, sub-1-locular, septifragal; seeds close minute.—Glabrous trees or shrubs; branches sometimes armed at nodes with 4 small spines; leaves opposite or alternate petiolate entire; flowers axillary cymose, spuriously umbellate; pedicels under flower 2-bracteolate. (*Antilles, Mexico.*[6])

11. **Tetrataxis** Hook. f.[7]—Flowers nearly of *Antherylium* (or *Grislea*) apetalous, 4-merous; calyx subcampanulate and externally vertically angularly alate between lobes, 5-fid, valvate, more or less persistent. Stamens 4, alternating with lobes of calyx and inserted in the hollows within it; filaments thick free exserted; anthers oblong, 2-locular. Germen free, sessile, 4-locular, 4-lobed above; style simple, at apex stigmatose entire. Ovules in cells ∞, ∞-seriately inserted on thick placentas, incompletely anatropous. Fruit exserted

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[1] Red, yellow, orange, violet, pink, sometimes pale purple or white.

[2] Equi-distant from both leaves and superposed to axil below.

[3] A genus very near to *Lythrum*, notwithstanding the irregularity of the flower, intermediaries being *Anisote* on the one hand, on the other species of *Cuphea* in which the flower is scarcely irregular. Subgenera 2 (*Lythrocuphea*, *Eucuphea*), ex Koehne (*App. alt. sem. Hort. berol.* ann. 1873), by whom the characters of the sections and subsections are carefully enumerated.

[4] Spec. about 88. Jacq. *Hort. Vindob.* ii. t. 177.—Cav. *Ic.* t. 380–382.—R. et Pav. *Fl. Per.* iv. t. 404.—A. S.-H. *Fl. Bras. Mer.* iii. 94, t. 182–185; *Mém. Mus.* ii. 37, t. 4, fig. 26–28.—H. B. K. *Nov. Gen. et Sp.* vi. 196, t. 550–552.—Hook. *Exot. Fl.* t. 161.—Griseb. *Fl. Brit. W.-Ind.* 269.—*Bot. Reg.* t. 852.—*Bot. Mag.* t. 2201, 2580, 4208, 4362.—Walp. *Rep.* ii. 105; v. 674; *Ann.* i. 294; ii. 540; iv. 689.

[5] *Skr. Nat. Selsk. Hafn.* ii. p. i. 211, t. 8.—DC. *Prodr.* iii. 91.—Endl. *Gen.* n. 6158.—B. H. *Gen.* 782, n. 20.

[6] Spec. 1, 2. Walp. *Rep.* ii. 112.

[7] *Gen.* 783, n. 23 (name being changed).—Baker, *Fl. Maurit.* 100.—*Tetradia* Dup.-Th. ex Tul. *Ann. Sc. Nat.* sér. 4, vi. 137 (not R. Br.).

capsular, septifragally 4-valvate; seeds ∞, oblong minute; cotyledons of straight rather fleshy embryo oblong, subauriculate at base; radicle rather thick.—A glabrous shrub; branches 4-gonal; leaves opposite, elongate, entire, shortly petiolate; flowers (rather large) axillary few cymose;[1] pedicels 2-bracteolate. (*Mauritius.*[2])

12. **Lagerstrœmia** L.[3]—Flowers generally 6-merous;[4] receptacle campanulate or turbinate, smooth, sulcate or angulate, sometimes alate (*Pterocalymna*[5]). Sepals 6, 3-angular, valvate; accessory teeth same in number small (or 0). Petals 6, inserted in throat of receptacle, unguiculate, undulately crispate, contorto-corrugate in æstivation. Stamens ∞, interior to petals; filaments free, sometimes very unequal;[6] anthers introrse, versatile, 2-rimose.[7] Germen free sessile at bottom of receptacle; cells 3–6, alternipetalous; style slender flexuose, at apex stigmatose capitellate. Ovules ∞, inserted in internal angle of cells, often ascending. Fruit capsular, girt at base with receptacle, thick coriaceous, loculicidally 3–6-valvate; valves septiferous in the middle. Seeds ∞, sometimes few, compressed, alate above; cotyledons of exalbuminous embryo straight, curved or contortuplicate; radicle cylindrical, oftener inferior.—Trees or shrubs; ramules 4-gonal; leaves opposite or sometimes alternate, petiolate, entire penninerved; flowers[8] in axillary and terminal racemes, often full, much branched, often 3-chotomous cymiferous, bracteate and 2-bracteolate.[9] (*Warm Asia, trop. Oceania.*[10])

13. **Duabanga** HAMILT.[11]—Flowers (nearly of *Lagerstrœmia*) 4–8-merous; receptacle widely cupular-turbinate. Sepals 4–8, marginally inserted, thick, 3-angular, valvate. Petals same in number alternate and stamens ∞ (of *Lagerstrœmia*). Germen adnate to

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[1] Spuriously umbellate.

[2] Spec. 1. *T. salicifolia.*

[3] *Gen.* n. 667.—J. *Gen.* 331.—DC. *Prodr.* iii. 93.—SPACH, *Suit. à Buffon*, iv. 439.—ENDL. *Gen.* n. 6164.—B. H. *Gen.* 783, n. 24.—H. BN. *Payer Fam. Nat.* 355.—HOOK. *Fl. Ind.* ii. 575.—*Velaga* GÆRTN. *Fruct.* ii. 245, t. 133.—*Münchhausia* L. *Mantiss.* 153.—*Banava* CAMELL. (ex RAY).—*Adambea* LAMK. *Dict.* i. 39.—*Arjuna* JONES, *Asiat. Res.* iv. 301 (ex ROXB.).—*Fatioa* DC. *Prodr.* iii. 88.

[4] More rarely 4–5-merous.

[5] TURCZ. *Bull. Mosc.* (1846) ii. 508.

[6] Of which 5, 6, alternipetalous, sometimes much longer; the others shorter subregularly fasciculate before each petal and nearly equal to each other.

[7] Pollen spherical (ex H. MOHL, *Ann. Sc. Nat.* sér. 2, iii. 331) in *L. indica*, and marked with 3 connivent lines at each pole, with an areolate pore between each of the lines.

[8] Often large, showy, pink or white.

[9] Bracts formed of 2 small lateral glanduliform stipules (?).

[10] Spec. 10–12. KÆMPF. *Amœn.* 855 (*Sibi*).—ROXB. *Pl. Corom.* t. 65, 66.—WIGHT, *Ill.* i. t. 86; *Icon.* t. 69, 109, 413.—BL. *Mus. Lugd.-Bat.* ii. t. 41, 42.—MIQ. *Fl. Ind.-Bat.* i. p. i. 620.—THW. *Enum. Pl. Zeyl.* 122.—WALP. *Rep.* ii. 114; *Ann.* i. 295; iv. 689.

[11] *Trans. Linn. Soc.* xvii. 178.—ENDL. *Gen.* n. 6165.—B. H. *Gen.* 783, n. 25.—HOOK. *Fl. Ind.* ii. 578.

bottom of receptacle, 4–8-locular; style elongate, at apex stigmatose capitately 4–8-lobed. Ovules in cells (complete or incomplete) ∞, ascending, curved. Fruit capsular, seated in thick cupule of receptacle, coriaceous or crustaceous, loculicidally 4–8-valved. Seeds very close small, ∞-seriate, scobiform, falcate, narrow winged above; cotyledons of straight exalbuminous embryo oblong ("green spotted"); radicle terete.—Tall trees; ramules 4-gonal; leaves opposite subsessile, cordate at base, nervose; flowers[1] in terminal ramose and cymiferous racemes.[2] (*Trop. Asia and Oceania.*[3])

14. **Lawsonia** L.[4]—Flowers 4-merous; receptacle shortly turbinate or subhemispherical. Sepals 4, 3-angular, valvate; accessory teeth 0 (or scarcely perceptible). Petals 4, alternate, exterior to disk, corrugately imbricate. Disk lining receptacle and unequally crenate at margin; 4 crenatures oftener larger, interior to base of petals and there rather prominent. Stamens 8, in pairs opposite to sepals; filaments thick subulate corrugately plicate, finally exserted; anthers ellipsoid, 2-rimose. Germen subglobose free; cells 4, oppositipetalous; style slender flexuose, finally exserted, at apex stigmatose capitate. Ovules in cells ∞, inserted on thick placenta, ∞-seriate. Fruit capsular pea-shaped, stipate at base with receptacle and calyx, globose, finally unequally dividing. Seeds ∞, obcuneate, unequally 4-gonal; coats externally thick spongy, internally hard; cotyledons of fleshy embryo suborbicular flat; radicle subcylindrical often accumbent.—A glabrous shrub; branches unarmed or often spinescent; leaves opposite ovato-lanceolate entire; flowers[5] collected in axillary corymbiform cymes. (*Trop. Asia, north-east. Africa.*[6])

15. **Pemphis** Forst.[7]—Flowers 5–6-merous; receptacle (nearly of *Grislea*) campanulate-turbinate, 12-costate. Sepals 3-angular; accessory teeth same in number, narrow. Petals 5, 6. Stamens 10–12, 2-seriate. Germen inserted at bottom of receptacle, shortly

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[1] White, large, "strong-smelling."

[2] A genus very near to *Lagerstrœmia*, and not unlike *Sonneratia*, which Benth. and Hook. place near *Duabanga*.

[3] Spec. 2, 3. Hook. f. *Ill. Himal. Pl.* t. 11.—Miq. *Fl. Ind.-Bat.* i. p. i. 624.—Walp. *Ann.* ii. 540.

[4] *Gen.* n. 482.—J. *Gen.* 331 (*Lausonia*). —Lamk. *Dict.* iii. 106; Suppl. iii. 39; *Ill.* t. 296.—DC. *Prodr.* iii. 90.—Spach, *Suit. à Buffon*, iv. 435.—Endl. *Gen.* n. 6159.—B. H. *Gen.* 782, n. 19.—H. Bn. *Payer Fam. Nat.* 354.—Hook. *Fl. Ind.* ii. 573. *Alcanna* Gærtn. *Fruct.* ii. 133, t. 110.

[5] Small, whitish, strong-smelling.

[6] Spec. 1. *L. inermis* L. *Spec.* 498.—Desf. *Fl. Atl.* i. 325.—*L. spinosa* L.—*L. alba* Lamk. *Dict.* iii. 106.—Hiern. *Fl. Trop. Afr.* ii. 483.—Wight, *Ill.* i. t. 87.—Boiss. *Fl. Or.* ii. 744.—Griseb. *Fl. Brit. W.-Ind.* 271.—Miq. *Fl. Ind.-Bat.* i. p. i. 620.—Benth. *Fl. Austral.* iii. 300.

[7] *Char. Gen.* 67, t. 34.—J. *Gen.* 331.—DC. *Prod.* iii. 89.—Spach, *Suit. à Buffon*, iv. 428.—Endl. *Gen.* n. 6148.—B. H. *Gen.* 780, t. 15.—Baker, *Fl. Maurit.* 101.—Hook. *Fl. Ind.* ii. 572.—*Maclellandia* Wight, *Icon.* t. 1996.

stipitate, 3-locular; style erect, at apex stigmatose capitate. Ovules in cells ∞, sometimes few, inserted on basilar placenta in angle of cell, ascending. Fruit capsular enclosed in receptacle, coriaceous, finally circumscissus or irregularly dehiscent, sub-1-locular. Seeds inserted on basilar placenta ∞, imbricate, ascending; testa expanded to thick wing; cotyledons of exalbuminous embryo plano-convex rather thick, auriculate at base; radicle inferior terete.—A ramose, sericeo-pilose or subglabrous shrub; leaves opposite entire rather thick; flowers[1] axillary solitary; peduncles 2-bracteate. (*Asia, warm shores of Africa and Oceania.*[2])

16. **Lafoensia** Vandell.[3]—Flowers 8–12-merous; tube of receptacle campanulate coriaceous. Sepals 8–12; accessory teeth same in number alternate, often small or scarcely perceptible. Petals same in number, inserted in hollows, unguiculate, corrugate, inflexed, finally erect or patent. Stamens double in number of petals, inserted below middle of receptacle, often spuriously 1-seriate; filaments long-subulate, oftener contorted in bud, finally far exserted; anthers introrse versatile, 2-rimose. Germen stipitate, 2-locular; dissepiment more or less incomplete; style very long-plicate, finally exserted, at apex stigmatose capitellate. Ovules in cells ∞, erect, oblong, inserted on thick basilar placenta, ∞-seriate, anatropous; micropyle extrorsely inferior. Capsule corticose, at first enclosed in receptacle, oblong, loculicidally 2-valvate, or sometimes opening unequally. Seeds ∞ on basilar placenta, imbricate, girt with a wide wing; cotyledons of exalbuminous embryo straight suborbiculate, auriculate at base; radicle short inferior.—Glabrous trees or shrubs; leaves opposite entire, glandulose to apex; flowers[4] axillary solitary or in more or less regular terminal cymes; bracteoles 2, sometimes (*Ptychodon*[5]) longer persistent. (*Trop. south. America.*[6])

17. **Physocalymma** Pohl.[7]—Flowers nearly of *Lafoensia*; sepals

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[1] White or pink, rather large.

[2] Spec. 1. *P. acidula* Forst.—Benth. *Fl. Austral.* iii. 300.—Miq. *Fl. Ind.-Bat.* i. p. i. 619.—Tul. *Ann. Sc. Nat.* sér. 4, vi. 132.—Hiern. *Oliv. Fl.Trop.Afr.* ii. 482.—Thw. *Enum. Pl. Zeyl.* 122.—*Lythrum Pemphis* L. f. *Suppl.* 249.—Lamk. *Ill.* t. 408, fig. 2.—*Melanium fruticosum* Spreng. *Syst.* ii. 455.—*Mangium porcellanicum* Rumph. *Herb. Amb.* iii. t. 84.

[3] *Rœm. Script.* 112, t. 7, fig. 13.—DC. *Mém. Soc. Gen.* iii. p. ii. 86; *Prodr.* iii. 94.—Spach, *Suit. à Buffon*, iv. 441.—Endl. *Gen.* n. 6162.—B. H. *Gen.* 781, n. 17.—H. Bn. *Payer Fam. Nat.* 354.—*Calyplectus* R. et Pav. *Prodr.* 73, t. 13.

[4] Large, showy, white or pink.

[5] Kl. ex Endl. *loc. cit.* 6.

[6] H. B. K. *Nov. Gen. et Sp.* vi 182 (*Calyplectus*).—Pohl, *Pl.Bras. Ic.* ii. 141, t. 197–199.—A. S.-H. *Fl. Bras. Mer.* iii. 157, t. 191.—Walp. *Rep.* ii. 113.

[7] *Pl. Bras. Ic.* i. 99, t. 82, 83.—DC. *Prodr.* iii. 89.—Spach, *Suit. à Buffon*, iii. 434.—Endl. *Gen.* n. 6163.—B. H. *Gen.* 781, n. 18.

8, valvate; accessory teeth 0 or scarcely perceptible. Petals 8. Stamens 24, spuriously 1-seriate; filaments inserted at bottom of receptacular tube above margin of thin disk; anthers curved versatile. Germen incompletely 1-locular; placentas basilar, ∞-ovulate. Capsule enclosed in widened tubular or ventricose receptacle, finally sub-1-locular, 2-valvate, polyspermous.—A branched tree;[1] leaves opposite entire, rather scabrous on both sides; flowers in loose compound oppositely-branched racemes; flowers[2] surrounded by 2, large, widely-rotundate concave bracteoles enclosing the bud.[3] (*North Brazil.*[4])

18? **Diplusodon** Pohl.[5]—Flowers nearly of *Lafoensia*, 6-merous; receptacle subcampanulate. Sepals 6, 3-angular, valvate; accessory teeth same in number alternate subulate (or sometimes very small). Petals 6, corrugately imbricate. Stamens 12–∞, pluriseriate, inserted at or below middle of receptacle; filaments slender subulate; anthers arcuate or hippocrepiform. Germen enclosed by receptacle; cells 3, very imperfect; placentas basilar (of *Lafoensia*), ∞-ovulate. Capsule enclosed by receptacle, loculicidally 2-valvate. Seeds ∞, erect, imbricate; testa alate; cotyledons of exalbuminous embryo auriculate at base; radicle short inferior.—Shrubs or undershrubs, sometimes handsome; leaves opposite or verticillate, subsessile entire, 3–∞-costate; flowers[6] axillary solitary or terminal and compound ramose, 3-chotomous; bracteoles 0 or 2. (*Brazil, Antilles.*[7])

II. CRYPTERONIEÆ.

19. **Crypteronia** Bl.—Flowers polygamo-diœcious apetalous. Male flower: receptacle cupuliform. Sepals 4, 5, 3-angular and stamens as many alternate, perigynously inserted at margin; filaments incurved in bud, finally straight exserted; anthers basifixed subdidymous, at apex introrsely or sublaterally rimose; connective

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[1] "Habit of *Lagerstrœmia*."

[2] Purple, showy.

[3] Representing a spurious calyx.

[4] Spec. 1. *P. florida* Pohl, *loc. cit.*

[5] *Flora* (1827) 150; *Pl. Bras. Ic.* 82, t. 66–81.—DC. *Prodr.* iii. 94 *a.*—Spach, *Suit à Buffon*, iv. 430.—Endl. *Gen.* n. 6161.—B. H. *Gen.* 781, n. 16.—H. Bn. *Payer Fam. Nat.* 355.—Kœhne, *Verhandl. der Bot. Ver. d. Prov. Brandenb.* (1874) 10, 23.—*Diplodon* Spreng. *Gen.* n. 1963.—*Friedlandia* Cham. et Schlchtl, *Linnæa*, ii. 348.—*Dubyæa* DC. *Diss. ined.* (1827).

[6] White, pink or yellow.

[7] Spec. 30–40. A. S.-H. *Fl. Bras. Mer.* iii. 143, t. 188, 189.—Pœpp. et Endl. *Nov. Gen. et Sp.* ii. 66, t. 192.—Walp. *Rep.* ii. 112; v. 675.

glandular at base. Germen in great part superior; cells 2, or more rarely 3, complete or incomplete; ovules ∞, parietal or subbasilar, ascending or transversely horizontal; style erect cylindrical, sometimes divisible to apex; at apex capitate stigmatose. Anthers of female flower sterile. Receptacle of male flower scarcely concave; germen small enclosed; style short; placentas parietal, marginally ∞-ovulate; ovules minute sterile. Fruit girt at base with receptacle and persistent sepals, capsular, loculicidally 2, 3-valvate; valves connected by persistent style, opening laterally. Seeds ∞, elongate; testa loose membranous, produced on both sides to a wing sometimes linear; with thin layer of albumen; cotyledons of cylindrical fleshy embryo shorter than thick radicle.—Branching trees; leaves opposite, simple entire petiolate exstipulate; flowers (small) in axillary simple or terminal ramose racemes. (*East India*, *Malaya*, *Philippine Isles.*)—See p. 438.

20. ? **Psiloxylon** Dup.-Th.—Flowers polygamo-diœcious; receptacle cupuliform. Sepals 5, 6, alternate, inserted at margin, imbricate, presently not contiguous. Petals 5, 6, alternate, inserted in hollows, imbricate, articulate at base, deciduous. Stamens 10–12, inserted 2-seriately with petals; filaments free exserted (in female flower short subulate sterile); anthers introrse, versatile, 2-rimose (in female flower 0). Gynæcium (in male flower small sterile) inserted at bottom of receptacle free; germen 3–4-locular; style short erect, presently 3–4-lobed; lobes compressed, much reflexed at top of germen, internally densely and thinly stigmatose-papillose. Ovules in cells ∞ (in male flower very small sterile), anatropous. Fruit globose baccate, girt at base with receptacle, crowned with style. Seeds ∞, small; testa cancellate; cotyledons of exalbuminous embryo thick plano-convex; radicle terete.—A small tree; leaves alternate, entire and coriaceous, penninerved, pellucid-punctulate; flowers in shortly racemiform or corymbiform (spurious ?) cymes. (*Mauritius*, *Bourbon ?*)—See p. 439.

III. AMMANNIEÆ.

21. **Ammannia** Houst.—Flowers hermaphrodite; receptacle campanulate, turbinate or tubular, lined with thin disk (or 0). Sepals 4–8, inserted at margin of receptacle, 3-angular, valvate; accessory

teeth as many alternate, sometimes very small (or 0). Petals 4–8, inserted in hollows, seldom large, generally small or very fugacious (sometimes 0). Stamens equal in number and opposite to petals, more rarely 2-verticillate and double in number, or sometimes 2, 3; filaments more or less elongate, inserted within receptacle; anthers 2-dymous, introrsely 2-rimose. Germen imbedded at bottom of receptacle, free, 1–5-locular; septa sometimes evanescent; style erect, slender or rather thick, enclosed or exserted, at apex stigmatose capitate subentire or obtuse. Ovules in cells ∞, oftener ∞-seriate. Fruit girt with receptacle, enclosed or exserted, capsular, dehiscing septicidally or septifragally, sometimes breaking irregularly. Seeds ∞, small angular; cotyledons of exalbuminous embryo thick, orbicular or elliptical, often auriculate at base; radicle short straight. —Herbs generally small, sometimes creeping, oftener annual, sometimes aquatic; stem oftener 4-gonal; leaves opposite or verticillate, rarely alternate, entire; flowers small axillary, solitary or cymose or glomerulate, generally few. (*All warm and temp. regions.*)—See p. 440.

22. **Rhyacophila** HOCHST.—Flowers nearly of *Ammannia*, 4-merous; receptacle campanulate. Sepals 4, valvate; accessory teeth as many small (or 0). Petals 4, oblong, rather large (*Hydrolythrum*) or minute. Stamens 4 (of *Ammannia*). Germen 2-locular, ∞-ovulate; style short, at apex stigmatose capitate. Disk hypogynous short or rather large (*Hydrolythrum*) unequally lobed. Capsule seeds and embryo of *Ammannia*.—Small aquatic herbs; leaves verticillate crowded linear; flowers in terminal racemes naked at base; bracts and bracteoles narrow or setaceous, sometimes more or less adnate and raised with the flower. (*India, Abyssinia.*)—See p. 443.

LVIII. ONAGRARIACEÆ.

I. ŒNOTHERA SERIES.

This family owes its name to *Onagra* (fig. 427–429), the best known species among us of the genus *Œnothera*.[1] Its flowers are regular and hermaphrodite. The receptacle has the form of a very long gourd, the bottom of which envelopes the ovary, quite inferior, and is prolonged upwards in a very long and narrow tubular neck, dilated above and bearing on the margin of its orifice the perianth and andrœcium. It is throughout lined with a disk, a thin glandular layer, covered with hairs, a little thickened near its opening and especially immediately above the summit of the ovary. The calyx is formed of four sepals,[2] two lateral, an anterior and a posterior, valvate in prefloration. With them alternate four petals, sessile, and contorted in the bud. The andrœcium is composed of eight stamens inserted close to the corolla and forming two verticils. Four are superposed to the sepals and four, a little shorter, to the petals. The filament is free and the anther versatile, bilocular, introrse, dehiscing by two longitudinal clefts.[3] The ovary, inferior, has four oppositipetalous cells, and is surmounted by a long slender style, the stigmatiferous extremity of which is divided into four large conical lobes. In the internal angle of each cell is a longitudinal placenta, charged with anatropous ovules, obliquely ascending, with micropyle turned outwards and downwards. After floration, every portion of the flower situated above the ovary is detached, and the fruit crowned with a scar, is a loculicidal capsule, the valves of which separate from top to bottom of a central column. The seeds, numerous, irregularly compressed, enclose a fleshy embryo, with conical radicle, most frequently inferior.

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[1] L. *Gen.* n. 469.—J. *Gen.* 319.—Lamk. *Ill.* t. 279.—Poir. *Dict.* iv. 550; Suppl. iv. 141.—DC. *Prodr.* iii. 45.—Spach, *Suit. à Buffon*, iv. 353; *N. Ann. Mus.* iv. (1835) 341.—Endl. *Gen.* n. 6115.—B. H. *Gen.* 789, n. 8.—H. Bn. *Fayer Fam. Nat.* 376.—*Onagra* T. *Inst.* 302, t. 156.—Adans. *Fam. des Pl.* ii. 85 (incl.: *Agassizia* Spach, *Anogra* Spach, *Baumannia* Spach, *Blennoderma* Spach, *Boisduvalia* Spach, *Calylophus* Spach, *Chamissonia* Link, *Chylisma* Spach, *Cratericarpium* Spach, *Godetia* Spach, *Hartmannia* Spach, *Holostigma* Spach, *Kneiffia* Spach, *Lavauxia* Spach, *Megapterium* Spach, *Meriolix* Rafin. *Pachylophus* Spach, *Sphærostigma* Endl. *Taraxia* Nutt. *Xylopleurum* Spach).

[2] M. Duchartre (*Ann. Sc. Nat.* sér. 3, xviii. 339) erroneously considers the calyx of *Œnothera suaveolens* as gamosepalous. Its parts are, on the contrary, free at every age.

[3] The pollen, in this series, presents very remarkable peculiarities. It is "flattened, triangular with papillæ on the angles; transparent or opaque; external membrane punctuate, united on the papillæ" (H. Mohl, *Ann. Sc. Nat.* sér. 2, iii. 332). The same author distinguishes, by the largeness of the papillæ, that of *Œnothera*, *Clarkia*, *Circæa,* whilst the papillæ are small in *Lopezia* and *Fuchsia.*

Œnothera biennis.

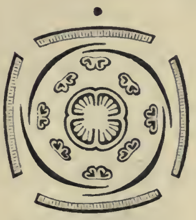

Fig. 428. Diagram.

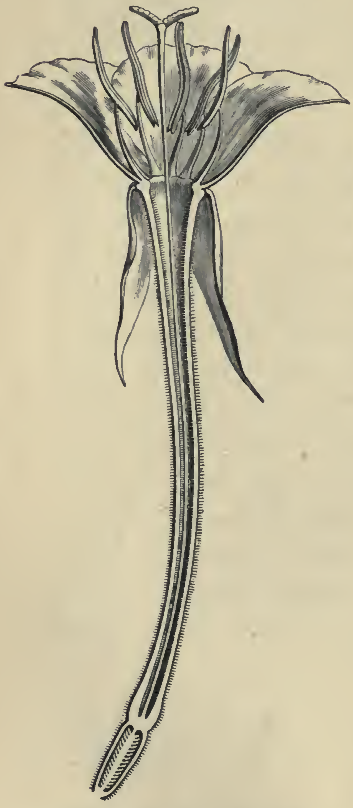

Fig. 429. Long. sect. of flower.

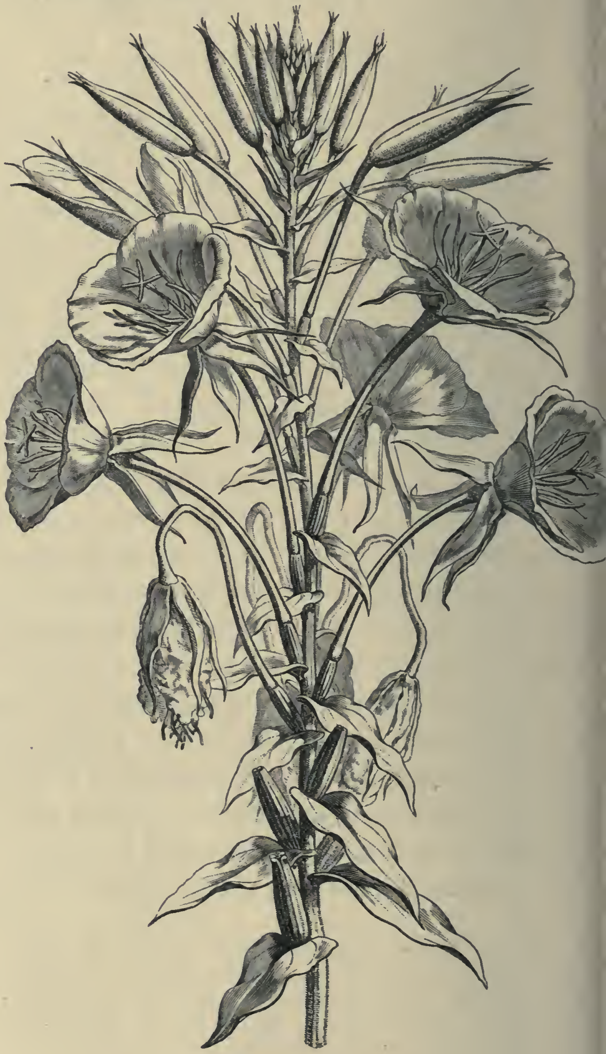

Fig. 427. Floriferous branch ($\frac{2}{3}$).

Œnothera speciosa.

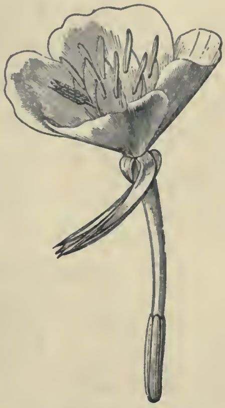

Fig. 430. Flower.

All the *Œnotheras* whose flower and fruit have the essential characters of *Onagra* have been ranged in a section *Eucœnothera.*[1] Those called *Meriolix*[2] (*Œ. serrulata*) have a little shorter receptacular tube and a stigma dilated in the form of a disk. The petals are not entire. In *Megapterium*[3] (*Œ. macrocarpa, missouriensis*), the receptacle is dilated around the fruit in large and thick vertical wings.[4] *Taraxia*[5] (*Œ. ovata, Nuttallii*, etc.) has also sometimes (*Œ. graciliflora*) winged fruit. The receptacular tube is long and slender; the stigma is capitate, the fruit sessile and the stem very short. *Cratericarpium*[6] (*Œ. subulata*) has the characters of the preceding sections, with a 4-dentate stigma, stamens with small anthers and fruit dilated at the summit. *Hartmannia*[7] (*Œ. rosea, tetraptera*), like *Cratericarpium*, is from South America. The fruit is often enlarged above, and the stigma is deeply divided into four lobes. The seeds are contained in distinct cavities of the pericarp.

Boisduvalia[8] and *Godetia*, by some distinguished as genera, have been, by others, referred to this type as simple sections. In the former, the receptacle rises above the ovary forming a funnel-shaped cup the height of which is nearly that of the ovary itself. In *Godetia*,[9] this open portion is shorter and especially extends a less distance downwards.[10] In both the extremity of the style is divided into four short lobes, and the capsular fruit has coats of little thickness.

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[1] Torr. et Gr. *Fl. N.-Amer.* i. (1840) 492.—Wats. *Proc. Amer. Acad.* viii. (1873) 574, 579 (incl.: *Onagra* T. *loc. cit.*—*Anogra* Spach, *Nouv. Ann. Mus.* iv. 323, 324.—*Kneiffia* Spach, *Nouv. Ann. Mus.* iv. 364; *Suit. à Buffon*, iv. 373.—*Pachylophis* Spach, *Nouv. Ann.* 356, t. 30; *Suit.* 365.—*Xylopleurum* Spach, *Nouv. Ann.* iv. 369; *Suit.* iv. 369.—*Lavauxia* Spach, *N. Ann.* 357, t. 31; *Suit.* 367 (part, ex Wats. *loc. cit.* 585).—*Baumannia* Spach, *Suit.* 351).

[2] Rafin. *Amer. Monthl. Mag.* [1819] ex Endl. *Gen.* 1190.—*Calylophis* Spach, *N. Ann. Mus.* iv. 337.—*Calylophus* Spach, *Suit. à Buffon*, iv. 366.

[3] Spach, *Nouv. Ann. Mus.* iv. 350; *Suit. à Buffon*, iv. 363.

[4] They recall in form and consistence a great number of *Combretaceæ* with winged fruit.

[5] Nutt. ex Torr. et Gr. *Fl. N. Amer.* i. 506.—Wats. *loc. cit.* 588, 605.—*Primulopsis* Torr. et Gr. *loc. cit.* 507.

[6] Spach, *Nouv. Ann. Mus.* iv. 397.

[7] Spach, *Nouv. Ann. Mus.* iv. 397; *Suit. à Buffon*, iv. 370.

[8] Spach, *Nouv. Ann. Mus.* iv. 327, t. 31; *Suit. à Buffon*, iv. 383.—Endl. *Gen.* n. 6118.—Wats. *loc. cit.* 578, 600.

[9] Spach, *Nouv. Ann. Mus.* iv. 326, t. 39; *Suit. à Buffon*, iv. 386.—Wats. *loc. cit.* 577, 596; *Geol. Surv. Calif. Bot.* i. 221.

[10] By this character, *Godetia* is intermediate between *Boisduvalia* and *Sphærostigma*, and appears, consequently, inseparable from either.

Sphærostigma[1] (fig. 431) comprises *Œnotheras*, in which the flowers, small in size, have a style with the stigmatiferous summit enlarged to a head spherical or nearly so. The ovary is surmounted by a prolongation, very short or even almost nil, of the receptacle a little dilated at this point and bearing on its margin the perianth and andrœcium. The ovary, four-celled, multiovulate, is narrow and elongate, and the seeds, ascending, are finally uniseriate.[3]

Œnothera (*Sphærostigma*) *micrantha.*

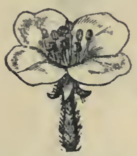

Fig. 431. Flower.

In *Eulobus*[4] *californicus*, hitherto retained as a separate genus, the flowers are those of *Œnothera* of the section *Sphærostigma*, with the superior orifice of the receptacle furnished with a glandular disk. The ovary fills nearly all the receptacular cavity. The fruit, four-celled with ascending seeds, is also similar to that of *Sphærostigma*, but it breaks open at maturity.[5] We can make this plant therefore only a section of the genus *Œnothera*.

Thus constituted[6] this genus contains about a hundred species.[7] They are annual or evergreen herbs, or exceptionally undershrubs, rare in tropical regions, abundant in North and South America, especially in the west; a single species (*Œ. tasmanica*) is from Van

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[1] Ser. *DC. Prodr.* iii. 46.—Endl. *Gen.* n. 6113.—Wats. *loc. cit.* 576, 591.—*Heterostemum* Nutt. (ex Endl.),—*Chamissonia* Link. *Jahrb.* (1818) 186.—*Holostigma* Spach, *Nouv. Ann. Mus.* iv. 332. — *Agassizia* Spach, *Suit. à Buffon*, iv. 347.

[2] The organization and development of this ovary are quite the same as in the true Œnotheras. Duchartre, as we have shown (*Adansonia*, xii. 25, 28), was mistaken on this point, in supposing that the inferior ovary is entirely of a foliaceous nature, and that at a certain age the carpellary leaves are separated from each other by the axis interposed. Nothing of the kind takes place in nature.

[3] In certain species of *Sphærostigma* the seeds become mucilaginous on the surface when wet. Of them the genus *Blennoderma* has been made. (Spach, *Nouv. Ann. Mus.* iv. 406.) The *Chylisma* of Nuttall (*Œ. brevipes*, *scapoidea*, etc.) are annual *Sphærostigmas*, the fruits of which are linear-claviform, pedicellate, and obtuse.

[4] Nutt. *Torr. et Gr. Fl. N.-Amer.* i. (1840) 514.—Endl. *Gen.* 1426, n. 6118.—B. H. *Gen.* 789, n. 7.—H. Bn. *Adansonia*, xii. 30; *Bull. Soc. Linn. Par.* 113.

[5] The ascending glabrous seeds are lodged in distinct depressions of the valves.

[6] Œnothera, sect. 12.
1. *Eucænothera* (Torr. et Gr.).
2. *Taraxia* (Nutt.).
3. *Megapterium* (Spach).
4. *Meriolix* (Rafin.).
5. *Hartmannia* (Spach).
6. *Cratericarpium* (Spach).
7. *Boisduvalia* (Spach).
8. *Godetia* (Spach).
9. *Sphærostigma* (Ser.).
10. *Blennoderma* (Spach).
11. *Chylisma* (Nutt.).
12. *Eulobas* (Nutt.).

[7] Gren. et Godr. *Fl. de Fr.* i. 584.—Griseb. *Fl. Brit. W.-Ind.* 273.—Torr. et Gr. *Fl. N.-Am.* i. 492.—A. Gray, *Man.* ed. 5, 178.—C. Gay, *Fl. Chil.* ii. 324, 346.—Presl, *Rel. Hœnk.* ii. 31.—Hook. *Icon.* t. 338, 339.—*Bot. Reg.* t. 763, 1040, 1142, 1479, 1593.—*Bot. Mag.* t. 347, 468, 2832, 2873, 3545, 3764, 5078.—Walp. *Rep.* ii. 79; *Ann.* i. 291; ii. 533; iv. 676.

Diemen's Land. The leaves are alternate, and the flowers[1] are solitary in the axils either of the leaves or of bracts at the extremity of the branches, so as to form elongate or capituliform spikes.

In *Gayophytum*,[2] slender annual herbs of Chili, Peru, and especially the western regions of North America, the flowers, small and tetramerous, are constructed like those of the *Œnotheras*, whose receptacle does not extend beyond the summit of the ovary, particularly like those of *Eulobus* and *Sphærostigma*; but the ovary has only two cells, and the capsule opens longitudinally in four pannels. Two of them correspond to the margins of the interlocular partition, and two larger to the back of the cells. The former bear at the middle of their internal surface the remains of the partition, the central portion of which generally separates finally in the form of a column from the peripherical portions. The seeds, in construction like those of *Onagra*,[3] have a smooth or papillose surface. The leaves of *Gayophytum* are alternate, linear, nearly always entire, rarely dentelate or crenelate. The flowers[4] are axillary, solitary, sessile or supported by a short peduncle. About half-a-dozen species are distinguished.[5]

Ludwigia is very near *Œnothera*; it has the flower of those in which the receptacular tube is not prolonged beyond the ovary, but bears immediately above its summit, crowned with epigynous glands, the perianth and andrœcium. The number of floral parts is often four or five, more rarely three or six. The sepals are valvate, and the petals, more or less developed, may be wanting in some species. The stamens are often double the sepals in number, and superposed half to the latter and half to the petals. This is the case in the species of which the genus *Jussiœa*[1] has been formed. The oppositipetalous stamens are there the smallest,[2] and sometimes they even remain sterile. In one species of this genus found in Europe, *L. palustris*, better known under the name of *Isnardia palustris*, the petals, four in number, are little developed, and with them alternate normally four epigynous stamens; but here and there may be observed besides in their intervals, one or two stamens which may be fertile. In the true *Ludwigia*, common especially in America, the oppositipetalous stamens are normally wanting; when they here and there exist, they are represented only by slender and sterile filaments. The genus *Ludwigia*, thus understood,[3] is moreover distinguished from *Œnothera* by its fruit, which, instead of being loculicidal, is poricidal or, more generally, septicidal. They are evergreen or annual herbs, nearly always aquatic, rarely shrubby at the base. The leaves are alternate or opposite, accompanied by stipules but little developed; the flowers[4] are ordinarily axillary, accompanied or not by a bud superposed to them, and they bear, at a greater or less height, on their peduncle or on their ovary, two lateral bracts, sometimes foliaceous.[5] This genus, abundant especially in all warm countries, is however represented in temperate North America and even in Europe. It comprises about forty species,[6] though nearly double that number have been described.

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[1] White, yellow, or pink, often large, handsome, sometimes odorous, nocturnal.

[2] A. Juss. *Ann. Sc. Nat.* sér. 1, xxv. 18. t. 4. —Spach, *Nouv. Ann. Mus.* iv. 331; *Suit. à Buffon*, iv. 346.—Endl. *Gen.* n. 6112.—B. H. *Gen.* 789, n. 6.

[3] To which the genus might perhaps be united as a sect. characterized by a dicarpellar ovary. (See *Adansonia*, xii. 29.)

[4] Small, often pink.

[5] Presl, *Rel. Hænk.* ii. 51.—Spach, *Nouv. Ann. Mus.* iv. 334 (*Holostigma*).—C. Gay, *Fl. Chil.* ii. 323, t. 22.—Walp. *Rep.* ii. 76.

[6] L. *Gen.* n. 153.—J. *Gen.* 319.—Desrx, *Lamk. Dict.* iii. 613; Suppl. iii. 511; *Ill.* t. 77.—Gærtn. *Fruct.* i. 158, t. 51.—DC. *Prodr.* iii. 58. —Spach, *Suit. à Buffon*, iv. 340.—Endl. *Gen.* n. 6110.—B. H. *Gen.* 788, n. 4.—Hook. *Fl. Ind.* ii. 588.—*Nematopyxis* Miq. *Fl. Ind.-Bat.* i. p. i. 630.—*Isnardia* L. *Gen.* n. 156.—Gærtn. *Fruct.* i. 158, t. 31.—Lamk. *Dict.* iii. 313; Suppl. iii. 187; *Ill.* t. 77.—J. *Gen.* 333; *Ann. Mus.* iii. 473. —DC. *Prodr.* iii. 59.—Endl. *Gen.* n. 6111.—*Dantia* Pet. *Gen.* 49, t. 49 (1710). This last name having priority, ought, in fact, to be preferred to all others. (See H. Bn. *Bull. Soc. Linn. Par.* 101.)

[7] The pollen has "seeds united in fours, each presenting three round umbilics (*Jussieua erecta*)" (H. Mohl, *Ann. Sc. Nat.* sér. 2, iii. 332).

Clarkia[7] is distinguished from *Onagra* and *Ludwigia* only by characters of little importance. The four petals are unguiculate instead of sessile, and most frequently three-lobed; but this character is not absolutely constant. The fruit is capsular and loculicidal. In the *Clarkias* proper, the receptacle is but slightly prolonged in a funnel above the ovary (fig. 432, 433), as in *Ludwigia* and some species of *Œnothera*, whilst in *Eucharidium*,[2] often considered a distinct genus, it is, like that of most *Onagras*, prolonged in a long and slender cylindrical tube. The andrœcium is diplostemonous; but the four oppositipetalous stamens are often small and sterile. The six species[3] of this genus are annual herbs of north-western America; they have alternate, elongate leaves, and axillary sessile and solitary flowers.

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[1] L. *Gen.* n. 538.—J. *Gen.* 319.—Lamk. *Dict.* iii. 330; Suppl. iii. 198; *Ill.* t. 280.—DC. *Prodr.* iii. 52.—Spach, *Suit. à Buffon*, iv. 340.—Endl. *Gen.* n. 6109.—B. H. *Gen.* 788, n. 3.—H. Bn. *Payer Fam. Nat.* 373.—Martins, *Mém. sur les Jussiœa* [1866], cum tab. 4.—Hook. *Fl. Ind.* ii. 587.—*Cubospermum* Lour. *Fl. Cochinch.* (ed. 1790) 275.—*Vigiera* Velloz. *Fl. Flum.* ii. t. 73, 74.—*Corynostigma* Presl, *Epim.* 218. (A great many authors have written *Jussieua* or *Jussia.*)

[2] They are finally more exterior than the large alternipetalous stamens, and each is accompanied within its base by a lobe of the epigynous disk in the form of a crescent with concavity exterior. Here and there oppositipetalous stamens, 1–3, are observed in the trimerous flowers of a curious plant from Senegal which De Candolle (*Mém. Onagrar.* [1829] 7, t. 2; *Prodr.* iii. 58) named *Prieurea*, and which by some has been considered an abnormal form of *Jussiœa*, by others of *Ludwigia*; which unites still more closely the two types. (See H. Bn. *Bull. Soc. Linn. Par.* 102.)

[3] Ludwigia, Sect. 3.
1. *Ludwigiaria* (DC. not L.).
2. *Dantia* (Pet.).
3. *Jussiœa* (L.).

[4] Yellow, sometimes rather large.

[5] The axillary bud may be developed. (See H. Bn. *Adansonia*, i. 182.)

[6] Gren. et Godr. *Fl. de Fr.* i. 585 (*Isnardia*).—A. S.-H. *Fl. Bras. Mer.* ii. 253, t. 131–133 (*Jussiœa*).—H. B. K. *Nov. Gen. et Sp.* vi. t. 530–533 (*Jussiœa*).—Wight, *Ill.* t. 101; *Ic.* t. 762.—Thw. *Enum. Pl. Zeyl.* 123.—Franch. et Sav. *Enum. Pl. Jap.* 169.—Oliv. *Fl. Trop. Afr.* ii. 488 (*Jussiœa*), 490.—Torr. et Gray, *Fl. N.-Amer.* i. 520 (*Jussiœa*), 521.—Walp. *Rep.* ii. 72 (*Jussiœa*), 74; ii. 664; *Ann.* i. 290; ii. 531; iv. 675.

[7] Pursh, *Fl. Amer. Sept.* i. 260, t. 11 (*Clarckia*).—Nutt. *Gen.* i. 249.—DC. *Prodr.* iii. 52.—Spach, *Nouv. Ann. Mus.* vi. 395; *Suit. à Buffon*, iv. 394.—Endl. *Gen.* n. 6119.—B. H. *Gen.* 789, n. 5.—*Phœostoma* Spach, *S. à Buffon*, iv. 392; *N. Ann. Mus.* iv. 327.—*Gruropsis* Presl. *Epim.* 219 (?).—*Opisanthes* Lilja, *Linnæa*, xv. 261.

Clarkia pulchella.[1]

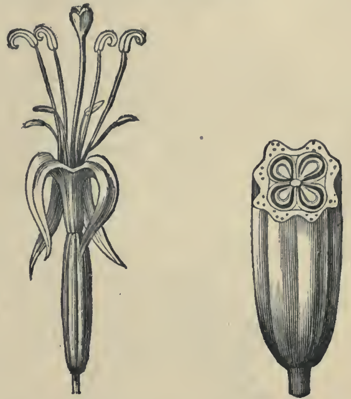

Fig. 432. Flower without corolla. Fig. 433. Trans. sect. of ovary.

Epilobium and *Zauschneria* have often been placed in a small separate group on account of this peculiarity, in itself of little importance, that their ascending seeds have their chalazic region charged with a long bunch of hairs (fig. 436, 437). In *Zauschneria*,[4] the receptacle is dilated, as in certain *Œnotheras*, in a funnel-shaped tube surmounting the ovary and bearing at its lower part eight glands, four of which are ascending and four descending.[5] *Z. californica*,[6] the only species, is subshrubby, with alternate sessile elongate leaves, and pretty axillary and sessile flowers. In *Epilobium*[8] (fig. 434–437), on the contrary, the receptacle is arrested, as in

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[1] Figures from the work of SPACH (*Suit. à Buffon*, Atlas, t. 35).

[2] FISCH. et MEY. *Ind.* ii. (1835) *Sem. Hort. Petr.* 36.—SPACH, *Nouv. Ann.* iv. 395.—ENDL. *Gen.* n. 6120.—B. H. *Gen.* 790, n. 9.—H. BN. *Payer Fam. Nat.* 374.

[3] LINDL. *Bot. Reg.* t. 1100, 1575, 1962 (*Eucharidium*), 1981.—TORR. et GR. *Fl. N.-Amer.* i. 515, 516 (*Eucharidium*).—*Bot. Mag.* t. 2918.—WALP. *Rep.* ii. 89.

[4] PRESL, *Rel. Hœnk.* ii. 28, t. 52.—SPACH, *Nouv. Ann. Mus.* iv. 405; *Suit. à Buffon*, iv. 400.—ENDL. *Gen.* n. 6122.—B. H. *Gen.* 788, n. 2.

[5] The latter are oppositipetalous.

[6] PRESL, *loc. cit.*—TORR. et GR. *Fl. N.-Amer.* i. 486.—HOOK. *Bot. Mag.* t. 4493.—WALP. *Rep.* ii. 93.—*Z. mexicana* PRESL.

[7] Very variable in form, down, etc.

[8] *Epilobium* L. *Gen.* n. 471.—J. *Gen.* 319.—GÆRTN. *Fruct.* i. 157, t. 31.—LAMK. *Dict.* ii. 373; Suppl. ii. 568; *Ill.* t. 278.—DC. *Prodr.* iii. 40.—SPACH, *Nouv. Ann. Mus.* iv. 403; *Suit. à Buffon*, iv. 398.—ENDL. *Gen.* n. 6121.—PAYER, *Organog.* 450, t. 94.—B. H. *Gen.* 471, n. 1.—H. BN. *Payer Fam. Nat.* 273.—HOOK. *Fl. Ind.* ii. 582.—*Chamænerium* TAUSCH, *Hort. Canal.* 1.—

Ludwigia, at the level, or may fall short, of the summit of the ovary. The flowers are tetramerous, regular or nearly so,[1] with eight stamens,[2] the filaments of which are somewhat dilated at the base and deflexed,[3] and the slender style terminates in a stigmatiferous head, enlarged in mass or divided into four lobes of very variable form. The fruit is loculicidal and four-valved, and the seeds are finally borne on a central column, free or nearly so. About fifty[4] species

Epilobium spicatum.

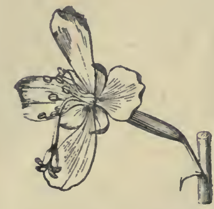

Fig. 434. Flower.

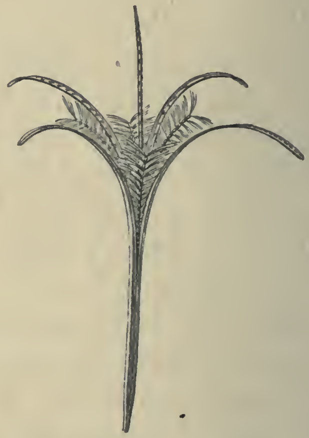

Fig. 435. Dehiscing fruit.

Epilobium spicatum.

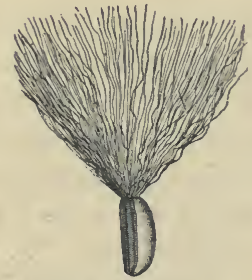

Fig. 436. Seed ($\frac{8}{1}$).

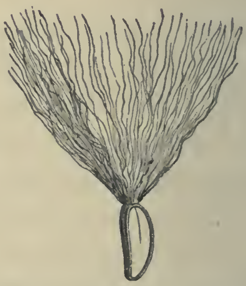

Fig. 437. Long. sect. of seed.

Spach, *Suit. à Buffon*, iv. 396.—*Lysimachion* Tausch, *loc. cit.*—*Crossostigma* Spach, *Nouv. Ann. Mus.* iv. 328.

[1] In the section *Lysimachion* (DC.).

[2] The pollen has ' seeds loosely united four to four; papillæ large, *E. montanum*, *E. hirsutum*" (H. Mohl, *Ann. Sc. Nat.* sér. 2, iii. 332).

[3] As in *Chamænerium.*

[4] Reichb. *Pl. Crit.* t. 170, 180, 189, 341, 342. —Gren. et Godr. *Fl. de Fr.* i. 576.—Oliv. *Fl. Trop. Afr.* ii. 486.—Torr. et Gr. *Fl. N.-Amer.* i. 486.—Hook. f. *Man. N.-Zeal. Fl.* 76.—C. Gay, *Fl. Chil.* ii. 346.—*Bot. Mag.* t. 76.—Walp. *Rep.* ii. 90; v. 665; *Ann.* ii. 534; iv. 678.

of *Epilobium* are described, from all cold and temperate regions of the globe; they are herbaceous or subshrubby, with alternate or opposite leaves, entire or dentate, and axillary (pink, white, or yellow) flowers, solitary or collected at the ends of branches in spikes or in clusters with short pedicels.

Hauya[1] *elegans* is a shrub from the warm parts of Mexico, the flower of which is closely analogous to that of the *Œnotheras* with long receptacular tube, a little dilated above. There its margin bears four coriaceous and valvate sepals, four petals and eight exserted stamens with long introrse anthers. The gynæcium is that of an *Onagra*, and the style terminates in a large stigmatiferous ball. In each of the ovarian cells (often incomplete) are numerous ascending ovules, which become as many imbricated seeds, with superior wing, in the capsular woody loculicidal fruit. The leaves are alternate, rarely subopposite, petiolate, tomentose, and the large flowers[2] are axillary, sessile, and solitary.[3]

Fuchsia[4] (fig. 438, 439) may be considered *Hauya* with fleshy fruit. The berry encloses a small or large number of reniform or angular seeds. The receptacular tube surmounting the ovary is very variable in form, cylindrical, or dilated from bottom upwards, or enlarged to a bowl. The flowers, tetramerous, have coloured sepals, more or

Fuchsia coccinea.

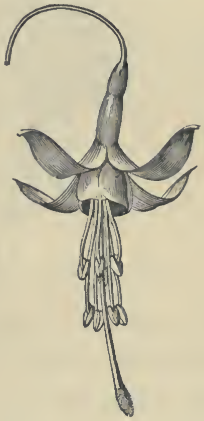

Fig. 438. Flower.

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[1] Moc. et Sess. *Fl. Mex. Icon. ined.* ex DC. *Mém. Onagrar.* 2, t. 1; *Prodr.* iii. 36.—B. H. *Gen.* 791, n. 11.

[2] Pinkish white.

[3] *Montinia acris* L. f. (*Suppl.* 427) a Cape shrub with alternate leaves was considered by De Candolle (*Mém. Fam. Onagrar.* 2; *Prodr.* iii. 35) as a type of a tribe of *Montinieæ*, retained by Endlicher (*Gen.* 1192), and admitted by Bentham and Hooker (*Gen.* 794, n. 22) as an abnormal genus in the *Onagrarieæ*. It has nearly the capsular fruit of *Hauya*, but bivalve, diœcious 4–5-merous flowers, and stamens equal in number and alternating with the petals, erroneously said to be wanting in the female flowers where they exist though sterile (H. Bn. *Adansonia*, xii. 38). The inferior ovary is wanting in the male flower, the shallow receptacle of which is covered with a fleshy disk around which are inserted the perianth and andrœcium. It has also been referred (Harv. and Sond. *Fl. Cap.* ii. 307) to the *Saxifragaceæ*. (See Burm. *Afr.* t. 90, f. 1, 2.—Gærtn. *Fruct.* i. 170, i. 33. —Lamk. *Ill.* t. 808.—Sm. *Spicil.* t. 15.)

[4] Plum. *Gen.* 14.—L. *Gen.* n. 128.—J. *Gen.* 320. —Lamk. *Dict.* ii. 564; Suppl. ii. 678; *Ill.* t. 282. —DC. *Prodr.* iii. 36.—Spach, *Suit. à Buffon*, iv. 404.—Endl. *Gen.* n. 6125.—B. H. *Gen.* 790, 1007, n. 10.—H. Bn. *Payer Fam. Nat.* 374 (incl.: *Encliandra* Zucc. *Skinnera* Forst.).

[5] Forst. *Char. Gen.* 57, t. 29.—Spach, *Ann. Sc. Nat.* sér. 2, iii. 178.

less fleshy, and petals sessile and contorted. In *Skinnera* formerly generically distinguished, the petals are small and sometimes even wanting. When they exist, they are either, as in *Fuchsia* proper,[1] contorted and contiguous, or expanded as in *Eucliandra*.[2] The latter has, moreover, polygamous flowers. These variations have served to arrange in three different sections, the species, about forty in number, constituting the genus *Fuchsia*, which are shrubs or small delicate trees, sometimes subshrubby plants from Mexico, South America, chiefly the western parts, also from New Zealand, with opposite, verticillate or alternate leaves, generally petiolate, entire or dentate, and with elegant flowers,[5] axillary, solitary or fasciculate, more rarely united in corymbs or terminal clusters, simple or compound, sometimes long and flexible, charged with small cymes, with the peduncles or floral pedicels generally long slender and pendant.

Fuchsia ampliata.

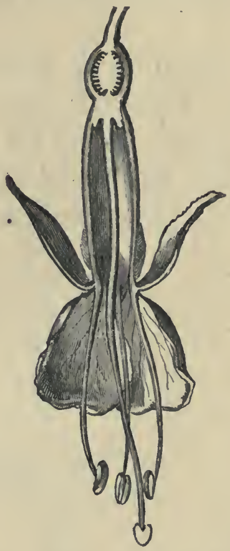

Fig. 439. Long. sect. of flower.

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[1] *Eufuchsia.*—*Fuchsia* Spach, *Suit. à Buffon*, iv. 404.—*Kierschlegeria* Spach, *loc. cit.* 403, *N. Ann. Mus.* iv. 330.—*Schufia* Spach. *S. à Buffon*, 411.—Desmoul. *Act. Soc. Linn. Bordeaux*, xxiv. —*Ellobium* Lilja, *Linnœa*, xv. 262.—*Spachia* Lilja, *loc. cit.* (not A. Juss.).—*Nahusia* Schnee. *Ic.* n. 21.—*Quelusia* Vandell.—Velloz. *Fl. Flum.* iv. t. 6.—*Dorvalia* Commers. (ex Endl.). —*Thilco* Feuill. *Obs.* iii. 64, t. 49.

[2] Zucc. *Abh. Bayer. Akad. Wiss.* ii. 335.—*Myrinia* Lilja, *Linnœa*, xv. 262.—*Brebissonia* Spach, *Ann. Sc. Nat.* sér. 2, iii. 175; *Nouv. Ann. Mus.* iv. 329; *Suit. à Buffon*, iv. 401.—*Lyciopsis* Spach, *Nouv. Ann. Mus.* iv. 329.

[3] Endl. *loc. cit.*—B. H. *Gen.* 791: 1. *Encliandra:* flowers polygamous; petals open; stamens short; 2. *Eufuchsia:* flowers hermaphrodite; petals none or convolute; stamens exserted; 3. *Skinnera:* flowers hermaphrodite; petals little developed; seeds small.

[4] R. et Pav. *Fl. Per.* iii. 86, t. 322–325.—H. B. K. *Nov. Gen. et Sp.* vi. 103, t. 534–536.—Cambess. *A. S.-H. Fl. Bras. Mer.* i. 272.—Presl. *Rel. Hœnk.* ii. 26.—C. Gay, *Fl. Chil.* ii. 349.—Hook. f. *Man. N.-Zeal. Fl.* 728.—Hook. *Icon.* t. 421.—Hemsl. *Journ. Bot.* [1876] 67.—*Bot. Reg.* t. 857, 1269, 1480, 1805; (1838), t. 1, 66; (1840), t. 18, 70; (1841), t. 66, 70.—*Bot. Mag.* t. 2507, 3364, 3948, 3999, 4174, 4082, 4233, 4375, 5907, 6139.—Walp. *Rep.* ii. 94; v. 666; *Ann.* i. 292; ii. 535; iv. 681.

[5] Red, pink, violet, or white. The calyx, rarely greenish, sometimes of two tints, is often coloured the same as the receptacle. These flowers often become double in culture, by the mutiplication of the petals. We have also seen each of the sepals or some of them prolonged externally in a sort of basilar spur, descending, curved or straight, hollow or flat.

II. GAURA SERIES.

Gaura[1] (fig. 440–442) most frequently has flowers with four parts; they are hermaphrodite. The receptacle has the form of a long narrow gourd lodging the ovary in its largest portion and prolonged above it in a narrow neck,[2] the upper opening of which bears four membranous valvate sepals,[3] and the same number of sessile petals, imbricate or contorted in the bud. The stamens, inserted with the perianth, are double the petals in number; four superposed to them and the other four alternate. The filaments are free, often declinate; the base is dilated internally to a squamiform process more or less prominent, according to the species. The anthers, bilocular and introrse, open by two longitudinal clefts. The ovary, inferior, is of four cells, complete or incomplete, surmounted by a style the base of which is surrounded by an epigynous disk with four lobes more or less distinct, and its stigmatiferous summit is divided into four thick and rather short lobes, superposed to the petals, and surrounded by a ring which the upper margin of the stylary tube forms round their

Gaura Lindheimeri.

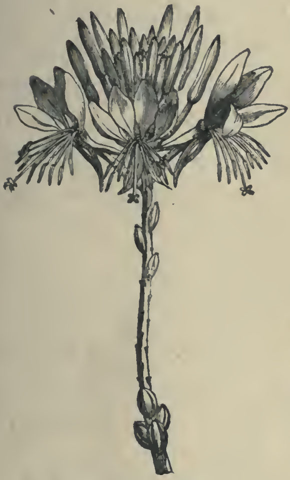

Fig. 440. Inflorescence.

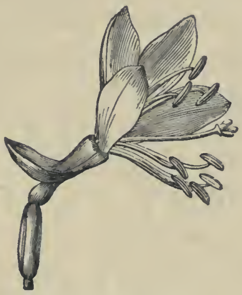

Fig. 441. Flower.

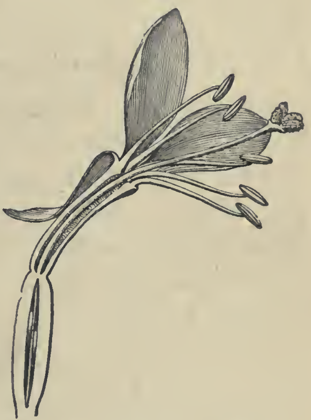

Fig. 442. Long. sect. of flower.

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[1] L. *Gen.* n. 470.—J. *Gen.* 319.—Gærtn. *Fruct.* ii. 205, t. 127.—Lamk. *Dict.* ii. 614; Suppl. ii. 711; *Ill.* t. 281.—DC. *Prodr.* iii. 44.—Spach, *N. Ann. Mus.* iv. 375; *Suit. à Buffon*, iv. 381.—Endl. *Gen.* n. 6134.—B. H. *Gen.* 792, n. 16.—H. Bn. *Payer Fam. Nat.* 374; *Adansonia*, xii. 36.

[2] Straight or deflexed.

[3] Ordinarily caducous.

base. In the internal angle of each cell are inserted one or two descending ovules, suspended by a rather long funicle, and anatropous, with the micropyle primarily[1] turned upwards and inwards.[2] The fruit, dry, coriaceous or woody at maturity,[3] is of four cells, one or more of which contain a descending seed. The latter encloses under its coats a fleshy albumen which envelopes an embryo with superior radicle and straight, undulated or plaited cotyledons.

There are *Gauras* with trimerous flowers and trigonal receptacular tube. Some, as *G. mollis* and *mutabilis*, have the stigmatic lobes straight and elongate; a genus, *Gauridium*,[4] has been made of them. Others, as *G. epilobioides*, etc., types of the genus *Schizocarya*,[5] have a fruit which opens superiorly by three or four clefts. In *G. linifolia*, generically distinguished under the name of *Stenosiphon*,[6] the interior basal appendix of the staminal filaments is scarcely visible or even nil, and the partitions of the ovarian cells are often incomplete. The genus contains about twenty species,[7] herbaceous, annual or evergreen, natives of the warmest parts of North America, principally the west. The leaves are alternate, generally narrow, entire, and the flowers,[8] disposed in clusters or spikes, simple or ramified, are solitary or grouped in small glomerules in the axil of alternate bracts borne by the slender axes of the inflorescence.

G. heterandra,[9] a Californian annual, has become the type of a genus *Heterogaura*,[10] distinguished from *Gaura* chiefly by tetramerous flowers with a short wide receptacular tube, and by stamens often sterile, inserted in variable number in front of each petal. The ovary is of four uniovulate cells, and the stigmatiferous extremity of the style is destitute of the peripherical collar of *Gaura*.

With the gynæcium of *Gaura*, *Gongylocarpus rubricaulis*,[11] a herbaceous plant of Mexico, has flowers which occupy the axil of the leaves or form a short spike (?) at the summit of the branches, situate each in the axil of a bract, and resemble at first a monstrous plant, because the inferior ovary is adnate with the branch that bears it and the base of the petiole of the axillary leaf. The same is the case, consequently, with the turbinate, deformed, subdrupaceous fruit. Above the ovary, the receptacle is elongated in a slender tube, the superior orifice of which, furnished with a glandular collar, supports four sepals, four petals, and two verticils of four stamens. The base of the style is surrounded by an epigynous disk, and the two or three cells of the ovary enclose each a descending ovule, with micropyle superior and primarily interior, but ultimately lateral. The plant, quite glabrous, with a reddish pruinose stem, bears alternate, petiolate, lanceolate, and dentelate leaves.

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[1] The ovules later direct their micropyle sidewise or even outwards.

[2] There is a double coat.

[3] It bears four salient columns, alternating with the cells, and corresponding to the bands of the fruit of *Gayophytum*, *Onagra*, etc. They are filled with 1–3 longitudinal woody bundles. Before complete maturity the fruit may be slightly drupaceous.

[4] SPACH, *Nouv. Ann. Mus.* iv. 325, 374; *Suit. à Buffon*, iv. 379.

[5] SPACH, *Nouv. Ann. Mus.* iv. 325, 381.

[6] SPACH, *Nouv. Ann. Mus.* iv. 326.—ROTHR. *Proc. Amer. Acad.* vi. 350 (1864).—WALP. *Rep.* v. 670.

[7] TORR. et GR. *Fl. N.-Amer.* i. (1840) 516.—H. B. K. *Nov. Gen. et Sp.* vi. t. 529.—ROTHR. *loc. cit.* 349.—WALP. *Rep.* ii. 96; v. 670; *Ann.* ii. 535; iv. 682.

[8] White or pink.

[9] TORR. et GR. *Pacif. R. R. Rep.* iv. 89.

[10] ROTHR. *Proc. Amer. Acad.* vi. 354 (1864).—B. H. *Gen.* 793, n. 18.

[11] CHAM. et SCHLCHTL, *Linnæa*, v. 557.—B. H. *Gen.* 793, n. 19.—H. BN. *Adansonia*, xii. 22.—WALP. *Rep.* ii. 97; v. 670.

III. CIRCÆA SERIES.

The flowers of the *Circeæ*[1] (fig. 443–446) are constructed on the binary type; they are hermaphrodite and have a receptacle in the form of a sac prolonged beyond the ovary in a short obconical tube, the margin of which bears two lateral valvate sepals, two alternate, imbricate petals, often sloped at the summit, and two stamens superposed to the sepals and formed each of a free filament and a bilocular introrse anther, dehiscing by two longitudinal clefts. The ovary is of two oppositipetalous cells, and is surmounted by a style surrounded by an epigynous disk the stigmatiferous summit of which is enlarged to a head with two small often unequal lobes. In the internal angle of each ovarian cell is inserted an ascending ovule,[2] more or less completely anatropous, with micropyle turned downwards and outwards.[3] The fruit, short, coriaceous, indehiscent, covered with hooked hairs, has one or two cells[4] containing each one ascending seed,[5] incompletely anatropous, with fleshy embryo, straight and destitute of albumen. The *Circeæ* are evergreen, little ramified herbs of the cold and temperate regions of Europe, Asia, and North

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[1] *Circæa* T. *Inst.* 301, t. 155.—L. *Gen.* n. 24.—Gærtn. *Fruct.* i. 114, t. 24. — Schkuhr, *Handb.* t. 2.—DC. *Prodr.* iii. 63.—Endl. *Gen.* n. 6130.—H. Bn. *Payer Fam. Nat.* 375; *Adansonia,* xii. 24.—B. H. *Gen.* 793, n. 20.—Aschers. et Magn. *Bot. Zeit.* (1870) n. 23 (392), 47–49.—Hook. *Fl. Ind.* ii. 589.—*Ocimastrum* Rupr. *Fl. Ingr.* 366.

[2] Sometimes two, nearly superposed.

[3] It has a double envelope.

[4] It is on this character that Ascherson and Magnus have founded their division of the genus into: A. *Uniloculares,* B. *Biloculares.*

[5] As it is incompletely anatropous, the hilum, situate near the middle of the interior margin, is finally parallel to the embryo.

America. The leaves are opposite, petiolate, oval, dentate or nearly entire, glabrous, hairy, penninerved. The flowers (small, white, or pink) are in terminal, simple or ramified clusters, with or without bracts. Six species[1] are distinguished.

Circæa lutetiana

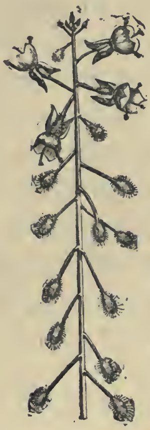

Fig. 443. Inflorescence.

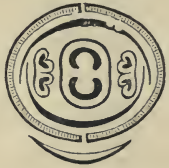

Fig. 445. Diagram.

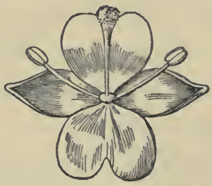

Fig. 444 Flower ($\frac{5}{1}$).

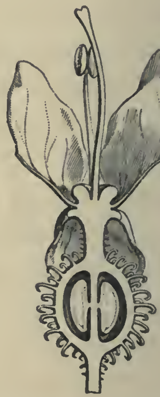

Fig. 446. Long. sect. of flower ($\frac{8}{1}$).

Diplandra lopezioides,[2] a Mexican shrub, has in its tetramerous ovary the uniovulate cells of *Circæa*, and the ovule directed the same; but the valvate sepals are four in number, also the petals, somewhat unequal, and of the two stamens, one is anterior, the other posterior. The fruit is a loculicidal capsule.

Lopezia[3] (fig. 447–452) has flowers much more irregular. They might be defined as monandrous *Diplandra*,[4] or at least with only one fertile stamen. The superior calyx is generally formed of four valvate sepals, and the corolla of four alternate dissimilar petals.[5] The posterior stamen is the fertile one; its anther is bilocular, introrse.[6] The anterior is transformed into a petal. The inferior ovary has four oppositipetalous and multiovulate cells. The fruit is a loculicidal and four-valved capsule.[1] Seven or eight species[2] of *Lopezia* are known; they are herbs with alternate or opposite leaves, accompanied by very small stipuliform and caducous scales; they inhabit the south-west of North America. The flowers are in clusters at the extremities of the branches.

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[1] Wight, *Ill.* t. 101.*—Royle, *Ill.* t. 43.—K. *Fl. Berol.* i. 168.—Curt. *Fl. Lond.* iii. t. 3.—Torr. et Gr. *Fl. N.-Amer.* i, 527.—Boiss. *Fl. Or.* ii. 752.—Gren. et Godr. *Fl. de Fr.* i. 585. —Walp. *Rep.* ii. 96.

[2] Hook. and Arn. *Beech. Voy. Bot.* 291, t. 60. —Endl. *Gen.* n. 6128.—B. H. *Gen.* 792.—H. Bn. *Adansonia*, xii. 37.

[3] Cav. *Icon.* i. 12, t. 18.—J. *Ann. Mus.* ii. 317, t. 30, fig. 30.—DC. *Prodr.* iii. 62.—Spach, *Suit. à Buffon*, iv. 414.—Endl. *Gen.* n. 6129.—B. H. *Gen.* 791, n. 13.—H. Bn. *Payer Fam. Nat.* 375; *Adansonia*, xii. 37.—*Pisaura* Bonato, *Monogr.* (1793) c. icon. (ex Endl.).—*Jehlia* Hort. (ex. B. H. *loc. cit.*).

[4] With multiovulate ovarian cells.

[5] There are occasionally flowers with five petals and two petaloid staminodes.

[6] The pollen is that of *Fuchsia*.

Lopezia racemosa.

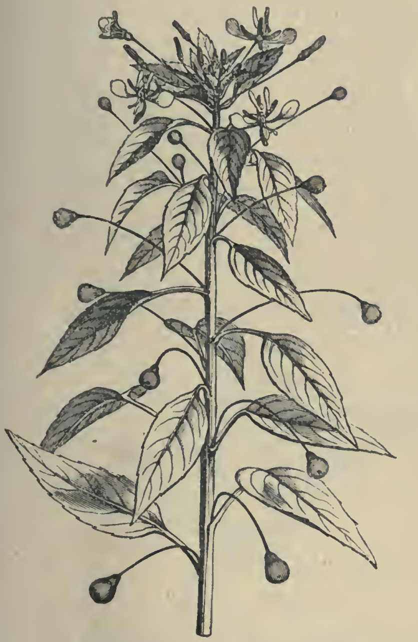

Fig. 447. Floriferous branch.

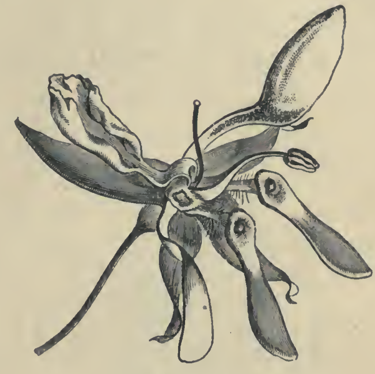

Fig. 448. Flower.

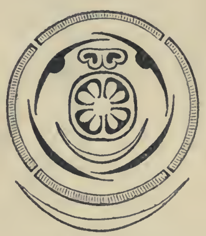

Fig. 449 Diagram.

In *Semeiandra grandiflora*,[3] a Mexican species, the flowers are those of a *Lopezia*, and also the fruit; but the stamens are united with the base of the style in a column adnate also with the anterior side of the floral receptacle. This character marks it as a very distinct section in the genus *Lopezia*.[4]

Lopezia racemosa.

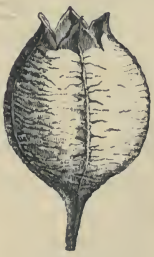

Fig. 450. Dehiscing fruit ($\frac{4}{1}$).

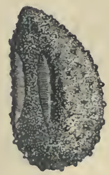

Fig. 451. Seed.

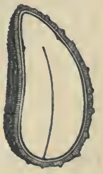

Fig. 452. Long. sect. of seed.

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[1] The seeds are often united two and two (fig. 451) in a single mass. Their external coat is rugose, granular.

[2] JACQ. *Collect.* v. t. 15; *Ic. Rar.* t. 203; *Eclog.* t. 109, 140.—BONPL. *Jard. Nav.* t. 25.—H. B. K. *Nov. Gen. et Sp.* vi. 95.—SCHRANK, *Hort. Monac.* t. 20.—*Bot. Mag.* t. 254, 4724.—WALP. *Rep.* ii. 96; v. 670; *Ann.* iv. 682.

[3] HOOK. and ARN. *Beech. Voy. Bot.* 291, t. 59.—ENDL. *Gen.* n. 6126.—*Bot. Mag.* t. 4727.—WALP. *Rep.* v. 669.

[4] We can here only doubtfully place a Mexi-

IV. TRAPA SERIES.

The flowers of *Trapa*[1] (fig. 453–456) are hermaphrodite and tetramerous. The receptacle has the form of a shallow cup, in which is inserted the base of the ovary, whilst its upper portion is free. The perianth and andrœcium are, consequently, inserted perigynously on the margin of the receptacular cup. The calyx is composed of four sepals, two of which are lateral, one anterior and one posterior, valvate or slightly covered at the margin by the preceding. Four sessile petals alternate with the sepals, imbricate and crumpled[2] in the bud. The stamens, inserted with the petals, outside a thick, crenelate or undulate perigynous disk, are four in number, superposed to the sepals, and formed each of a free subulate filament, and a bilocular anther, dehiscing introrsely or marginally.[3] The ovary, in great part superior, is of two lateral cells, surmounted by a style

Trapa natans.

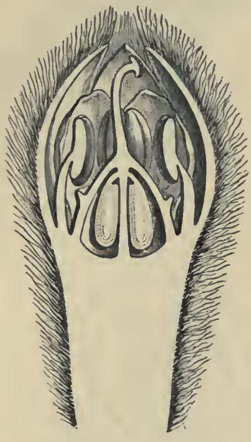

Fig. 455. Long. sect. of flower.

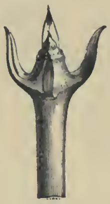

Fig. 453. Flower without corolla.

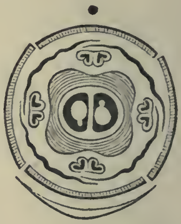

Fig. 454. Diagram.

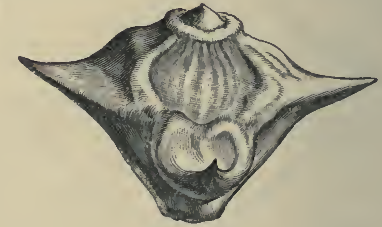

Fig. 456. Fruit.

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can type still imperfectly known, *Reisenbachia* PRESL (*Rel. Hœnk.* ii. 36, t. 54), considered as a distinct genus by ENDLICHER (*Gen.* n. 6127) and by BENTHAM and HOOKER (*Gen.* 762, n. 14), and which appears to differ from *Lopezia* only in the absence of a corolla, if the analysis of PRESL is correct.

[1] *Trapa* L. *Gen.* n. 157.—ADANS. *Fam. des Pl.* ii. 84.—J. *Gen.* 68.—GÆRTN. *Fruct.* i. 127, t. 26.—LAMK. *Ill.* t. 75.—DESRX. *Dict.* iii. 669.—TURP. *Dict. Sc. Nat.* Atl. t. 219.—DC. *Prodr.* iii. 63.—NEES, *Gen.* ii. t. 5.—SPACH, *Suit. à Buffon*, iv. 443.—ENDL. *Gen.* n. 6140.—BARNÉOUD, *Ann. Sc. Nat.* sér. 3, ix. 222, t. 12–15.—PAYER, *Org.* 455, t. 106.—B. H. *Gen.* 793, n. 21.—H. BN. *Payer Fam. Nat.* 378; *Adansonia*, xii. 24.—HOOK. *Fl. Ind.* ii. 590.—*Tribuloides* T. *Inst.* 565, t. 431.—*Shringata* JONES, *As. Res.* ii. 350; iv. 253.

[2] It is sometimes twisted.

[3] Pollen dry, elliptical; in water, trigonal, like that of the *Œnothereæ*. (BARNÉOUD.)

capitate and stigmatiferous at the summit. In each of the cells is a descending, anatropous ovule, with micropyle at first interior and superior.[1] The fruit, turbinate, dry, coriaceous, indehiscent, bears at the summit the scar of the style, and is laterally dilated about the middle of its height, into four or two conical spinescent projections formed by the persistent and hypertrophiate sepals. Its single cell contains but one seed the coats of which enclose a large incurved embryo, with superior radicle and very unequal cotyledons: one very small, squamiform; the other large, fleshy.[2] *Trapa* consists of aquatic herbs, of which two or three species,[3] living in Europe and the warm parts of Asia and Africa, are distinguished. The slender floating stems bear two kinds of leaves.[4] The lower, submerged, are opposite, pinnatisect, not unlike finely pectinate roots. The upper, floating on the surface of the water, are united in rosettes and nearly lozenge-shaped, dentate, penninerved, with an elongate petiole which is most frequently dilated superiorly in a spongy enlargement destined to sustain the summit of the plant at the surface of the water.[5] The flowers[6] are axillary, solitary, with a short and thick peduncle, accompanied by two lateral sterile bracteoles.

V. HALORAGIS SERIES.

Haloragis[7] (fig. 457–461) has tetramerous flowers,[8] most frequently polygamous, more rarely hermaphrodite. In the latter, the receptacle has the form of a sac with four to eight angles or longitudinal ribs. On its margin is inserted a superior perianth, composed of four sepals, two of which are lateral,[9] and four alternate petals, imbricate or more rarely contorted. The stamens are inserted within the perianth, that is, they are epigynous; they are eight in number, in two verticils and superposed, four to the sepals, and four, often shorter, to the petals. The filaments are slender, and the anthers elongate, basifixed or nearly so, dehiscing by two nearly lateral clefts. The gynæcium, rudimentary in the male flowers, is composed of an inferior ovary, with four oppositipetalous cells, rarely two cells, surmounted by the same number of short stylary branches, at summit stigmatiferous papillose or plumose. In the internal angle of each ovarian cell is a descending anatropous ovule, with micropyle interior and superior. It not unfrequently happens that the interlocular partitions disappear more or less completely, and the ovary, consequently, appears reduced to a single quadriovulate cell. The fruit, pyramidal, angular or winged, is a drupe, the thin mesocarp of which finally becomes quite dry. The putamen contains, in each cell, a descending seed, the coats of which enclose a fleshy albumen and an axile embryo, with superior radicle and very small cotyledons. *Haloragis* consists of herbaceous or subshrubby plants, of which some forty species[1] are known, natives of Asia, Oceania, and the

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[1] Later the ovule undergoes a twisting movement which renders its raphe lateral. It has a double envelope, and is not unlike in form and direction that of the common *Box*.

[2] The other seed is early aborted, but its remains are seen for a long time.

[3] ROXB. *Pl. Corom.* t. 234.—BRAAM, *Ic. Chin.* t. 22.—OLIV. *Fl. Trop. Afr.* ii. 491.—GREN. et GODR. *Fl. de Fr.* i. 588.—WALP. *Rep.* ii. 100.

[4] For the study of the germination, and also that of ramification, etc., consult the very beautiful work of MIRBEL (*Ann. Mus.* xvi. 447, t. 19) and also that of BARNÉOUD mentioned above.

[5] Precisely the same disposition is met with in certain *Jussiææ* which have quite the leaves of *Trapa*. When young, the leaves appear to have two small stipules.

[6] White or greenish, without lustre.

[7] *Haloragis* FORST. *Char. Gen.* 61, t. 31.—POIR. *Dict.* viii. 854.—LHÉR. *Stirp.* t. 82.—DC. *Prodr.* iii. 66.—ENDL. *Atakt.* t. 15; *Gen.* n. 6138.—B. H. *Gen.* 674, n. 2.—H. BN. *Payer Fam. Nat.* 376; *Adansonia*, xii. 22.— *Cercodia* MURR. *Comm. Gœtt.* iii. (1780) 1. t. 1.—GÆRTN. *Fruct.* i. 164, t. 32.—*Cercodea* LAMK. *Ill.* t. 319.—*Gonocarpus* THUNB. *Fl. Jap.* 5, t. 15.—GÆRTN. F. *Fruct.* 250, t. 25.—*Gonatocarpus* W. *Spec.* i. 690.—*Gonjocarpus* KŒN. *Ann. Bot.* i. 546, t. 12, fig. 5, 6. —*Goniocarpus* DC. *Prodr.* iii. 67.

[8] More rarely of three or five parts.

[9] Sometimes nearly peltate, or slightly decurring under the point of insertion on the floral receptacle.

Haloragis alata.

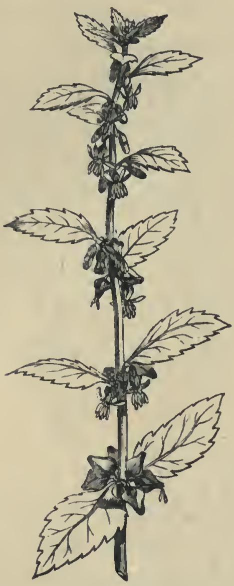

Fig. 457. Floriferous branch.

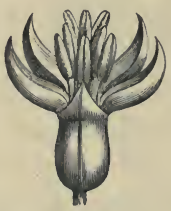

Fig. 458. Flower.

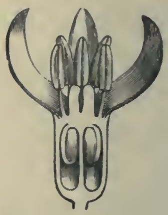

Fig. 459. Long. sect. of flower.

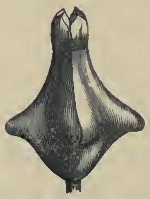

Fig. 460. Fruit.

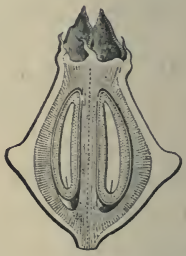

Fig. 461. Long. sect. of fruit.

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[1] Labill. *N.-Holl.* t. 53 (*Gonjocarpus*), 128, 129.—Jacq. *Ic. Rar.* i. t. 69.—Ad. Br. *Duperr. Voy. Bot.* t. 68–70.—A. Rich. *Fl. N.-Zel.* 324.—Hook. f. *Fl. Tasman.* i. t. 22; *Man. N.-Zeal. Fl.* 64.—Benth. *Fl. Austral.* ii. 473.—F. Muell. *Fragm. Phyt. Austral.* viii. 162.—Hook. *Icon.* t. 290, 311 (*Goniocarpus*).—Franch. et Sav. *Enum. Pl. Jap.* 164.—Walp. *Rep.* ii. 99; v. 672; *Ann.*

island of Juan Fernandez. Their leaves are opposite or oftener alternate, especially at the top of the plant, sometimes entire, sometimes dentate or pinnatifid, accompanied by two small caducous stipules; often replaced by bracts at the summit of the branches. The result is that the flowers,[1] axillary to a certain point, may above form a spike or terminal cluster. In the axil of each leaf or bract is either a solitary flower, with or without lateral bracts, or a cyme, or a few-flowered glomerule; the pedicels, when present, are short and often pendant.

Meionectes[2] and *Loudonia* are very near *Haloragis*, and should not be separated from it. The former is *Haloragis* on a dual[3] type, that is with two sepals, two petals, two verticils of two stamens, and an ovary with two uniovulate cells. *M. Brownii*, the only species known,[4] herbaceous and glabrous, grows in South Australia and Tasmania. *Loudonia*[5] (fig. 462–464), native of the same countries, has dimerous or tetramerous and 4–8-androus flowers, and the 4-winged ovary has two or four cells, the separating partition of which disappears more or less completely at a certain age and is represented

Loudonia aurea.

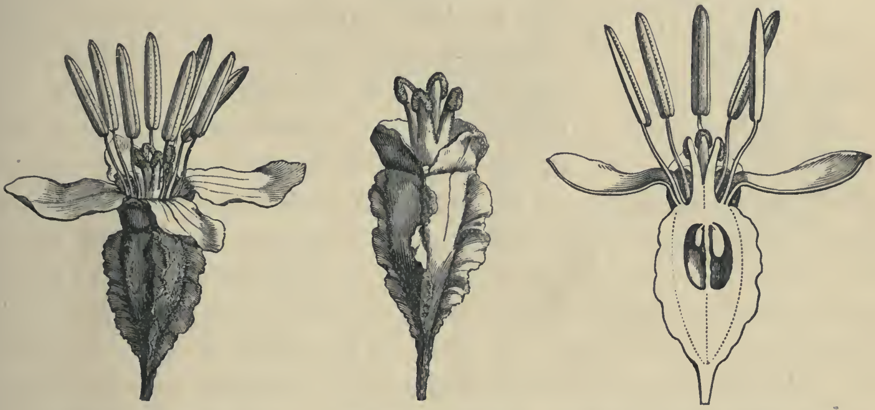

Fig. 462. Flower ($\frac{5}{1}$). Fig. 464. Gynæcium. Fig. 463. Long. sect. of flower.

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i. 293; ii. 537, 538 (*Goniocarpus*); iv. 883; vii. 940.

[1] Small, yellow, greenish or reddish.

[2] R. Br. *Flind. Voy. App.* ii. 550.—Endl. *Gen.* 1197.—B. H. *Gen.* 675, n. 3.—H. Bn. *Adansonia*, xii. 34.

[3] We have shown that this character does not permit its being made other than a section of the genus *Haloragis*.

[4] *M. Brownii* Hook. f. *Hook. Icon.* t. 306; *Fl. Tasm.* i. 123.—Benth. *Fl. Austral.* ii. 486.—*M. Preissii* Nees, *Pl. Preiss.* i. 224.—*Haloragis Meionectes* R. Br.

[5] Lindl. *Sw. Riv. App.* 42, c. ic.; *Veg. King.* (1846) 722, fig. 382.—Endl. *Gen.* n. 6139.—B. H. *Gen.* 674, n. 1.—H. Bn. *Payer Fam. Nat.* 377; *Adansonia*, xii. 34.—*Glischrocaryon* Endl. *Ann. Wien. Mus.* ii. 209; *N. st. Mus. Vindob. Dec.* n. 88.

only by a vertical filament. But the organs of vegetation in these evergreen plants differ from those of *Haloragis*. The leaves[1] are alternate, linear, entire, rather fleshy; and the flowers, arranged in terminal corymbs of cymes, are yellow and rather large compared with those of *Haloragis*. Three species have been distinguished.[2]

Myriophyllon verticillatum.

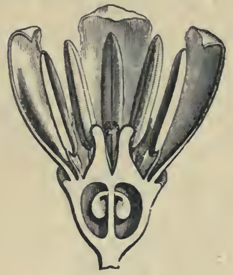

Fig. 465. Long. sect. of flower.

Myriophyllon[3] (fig. 465) has also nearly the organization of *Haloragis*; but the flowers are monœcious, or rather, on the same inflorescence, there are female flowers at the base and male flowers at the summit; but not unfrequently hermaphrodite flowers are intermixed with both. They are dimerous or oftener tetramerous. The petals are imbricate or contorted. The stamens number from two to eight, in construction like those of *Haloragis*.[4] In the male flowers the gynæcium is rudimentary or nil, whilst in the female, the petals of which are often smaller (or even nil), the stamens (when present) are sterile, and the gynæcium attains a full development. The ovarian cells are four in number, superposed to the petals, surmounted by as many obtuse or plumose stylary branches, often recurved. Each cell contains one or two ovules,[5] in direction like those of *Haloragis*, and the fruit, dry or drupaceous, separates into two or four monospermous cocci. Some fifteen species[6] of this genus[7] are distinguished; they are aquatic herbs, with alternate, opposite, or verticillate leaves, linear or oval, entire, dentate or pinnatifid and pectinate when submerged. In *Myriophyllon verticillatum*, the flowers occupy the axil of these pectinate leaves, larger than themselves, whilst, in *M. spicatum*, for example, short bracts replace these leaves, and the whole emerged inflorescence constitutes a terminal spike. The flowers in the axil of each leaf or bract, are solitary or united in small glomerules. This genus belongs to the warm and cold regions of all parts of the world.

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[1] Which become green or black in drying.

[2] Benth. *Fl. Austral.* ii. 471.—Walp. *Ann.* i. 293; iv. 821; vii. 938.

[3] Vaill. *Act. Acad. Par.* (1719) t. 2, fig. 3.—Adans. *Fam. des Pl.* ii. 471.—*Myriophyllum* L. *Gen.* n. 1066.—J. *Gen.* 18; *Ann. Mus.* iii. 321.—Schkuhr, *Handb.* t. 296.—Gærtn. *Fruct.* i. 331, t. 68.—Lamk. *Dict.* iv. 189.—Turp. *Dict. Sc. Nat.* Atl. t. 217.—DC. *Prodr.* iii. 68.—Spach, *Suit. à Buffon*, iv. 446.—Nees, *Gen.* fasc. 8, t. 13.—Endl. *Gen.* n. 6135.—B. H. *Gen.* 676, n. 8.—H. Bn. *Payer Fam. Nat.* 377; *Adansonia*, xii. 35.—*Pentapterophyllum* Dill. *Nov. Gen.* 7.—*Pentapteris* Hall. *Helv.* i. 454.—*Enydria* Velloz. *Fl. Flum.* i. t. 150.—? *Hylas* Bigel. (ex Endl. *loc. cit.*).—*Purshia* Rafin. *N.-York Med. Repos.* ii. 361 (not DC. nor Dennst. nor Spreng.).—*Burshia* Auctt. (erron.).—*Pelonastes* Hook. f. *Lond. Journ. Bot.* vi. 474.—*Mullofullon* Diosc.—*Belioukandos* Celt. (ex Adans.).

[4] The pollen is spherical; on the equator, four small pores surrounded by a halo: *M. verticillatum* (H. Mohl. *Ann. Sc. Nat.* sér. 2, iii. 331).

[5] The funicle may sometimes thicken above the micropyle to a short obturator.

[6] Labill. *N.-Holl.* ii. t. 220.—Fr. et Sav. *Enum. Pl. Jap.* 164.—Brew. et Wats. *Geol. Surv. Calif. Bot.* i. 215.—Wight, *Ill.* t. 102.—Torr. et Gr. *Fl. N.-Amer.* i. (1840) 528.—C. Gay, *Fl. Chil.* ii. 356.—Harv. and Sond. *Fl. Cap.* ii. 572.—Hook. *Icon.* t. 289.—Hook. f. *Fl. Tasm.* i. t. 23; *Man. N.-Zeal. Fl.* 66.—Benth. *Fl. Austral.* ii. 486.—Miq. *Fl. Ind.-Bat.* i. p. i. 634.—Thw. *Enum. Pl. Zeyl.* 123.—Boiss. *Fl. Or.* ii. 754.—A. S.-H. *Fl. Bras. Mer.* ii. 251.—Gr. et Godr. *Fl. de Fr.* i. 587.—Walp. *Rep.* ii. 98; *Ann.* i. 292; ii. 537; vii. 943.

[7] Divided by Torrey and A. Gray (*op. cit.*) into 3 sections: 1. *Sphondylophyllum* (Torr. et

Serpicula[1] (fig. 466, 467) has also nearly the flowers of the preceding genera, small, monœcious, and disposed in cymes or in axillary glomerules; the number varies at the level of each leaf. One of the flowers of the cyme is male with a long pedicel; the others are sessile or nearly so and female. The male flowers have four sepals, four concave petals, and four alternate, oppositipetalous[2] stamens, or from six to eight stamens. The gynæcium is there rudimentary and sterile. In the female flowers, the inferior ovary is surmounted by four sepals and four petals. The stamens are rudimentary or without anthers, or even disappear entirely, and the ovarian cells, separated by incomplete partitions, contain each one ovule of *Haloragis*. *Serpicula*, of which three or four species,[3] from the marshes of Asia, Africa, and tropical America, are distinguished, consists of herbs with opposite or alternate leaves, narrow, entire or dentate.

Serpicula repens.

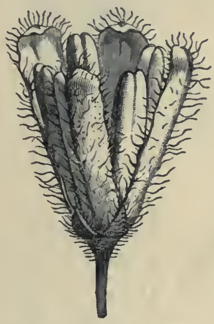

Fig. 466. Flower ($\frac{5}{1}$).

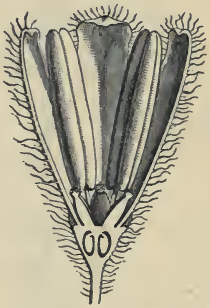

Fig. 467. Long. sect. of flower.

Gr.); 2. *Sphondylastrum* (Torr. et Gr.); 3. *Ptilophyllum* (Nutt.).

[1] L. *Mantiss.* 16.—J. *Gen.* 318.—Lamk. *Ill.* t. 758.—Poir. *Dict.* vii. 122; Suppl. v. 136.—DC. *Prodr.* iii. 65.—Endl. *Gen.* n. 6136.—B. H. *Gen.* 675, n. 4.—H. Bn. *Payer Fam. Nat.* 377.—*Laurenbergia* Berg. *Pl. Cap.* 350 (not H. Bn.).—*Epilithes* Bl. *Bijdr.* 734; *Mus. Lugd.-Bat.* i. 110.

[2] In this case they are often lodged in the cavity of the petals to which they appear superposed; but that is only a consequential appearance; they are really alternipetalous.

[3] A. S.-H. *Fl. Bras. Mer.* ii. 250.—Wight, *Icon.* t. 1001.—Thw. *Enum. Pl. Zeyl.* 123.—Miq. *Fl. Ind.-Bat.* i. p. i. 632.—Harv. and Sond. *Fl. Cap.* ii. 572.—Tul. *Ann. Sc. Nat.* sér. 4, vi. 125.—Oliv. *Fl. Trop. Afr.* ii. 405.—Walp. *Rep.* ii. 98; *Ann.* ii. 537; vii. 941.

Proserpinaca[1] (fig. 468–471) also consists of aquatic herbs. The leaves are alternate, entire, dentate or pectinate and pinnatifid, like those of *Myriophyllon.* The flowers[2] are hermaphrodite, axillary, solitary or grouped in cymes; they are often trimerous or more rarely tetramerous, and differ from those of the preceding genera by two principal characters: the petals are wanting, and the stamens, superposed to the sepals, are the same in number as the latter and reduced to a single verticil. All the other important traits of their organization are those of *Haloragis.* Thus, the floral receptacle is concave, bell-shaped, and its cavity is filled by the adnate and inferior ovary, the cells of which, three or four in number, contain each a descending ovule, with micropyle interior and superior. On the margin of the receptacle are inserted epigynously the sepals, which are valvate, and the superposed stamens, the filaments of which are short and erect and the anthers basifixed. Two species[3] are known, from the Antilles and North America.

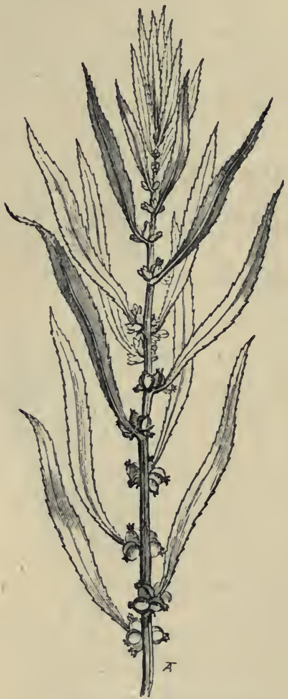

Fig. 468. Floriferous and fructiferous branch.

Proserpinaca palustris.

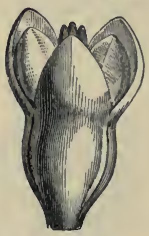

Fig. 469. Flower ($\frac{4}{1}$).

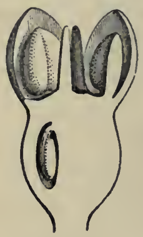

Fig. 470. Long. sect. of flower.

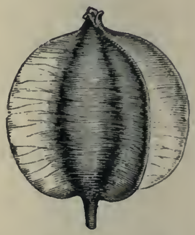

Fig. 471. Fruit.

VI. GUNNERA SERIES.

Gunnera[4] (fig. 472–475) has polygamous or monœcious flowers. In those which are hermaphrodite (fig. 475) and generally dimerous),[1] there is an ovoid or compressed sacciform receptacle, the cavity of which contains the adnate and inferior ovary, and the margin of which bears the perianth and andrœcium. First on opening are seen two small projections, anterior and posterior, ordinarily considered as sepals, and on the sides, alternating with these projections, two folioles, much more developed, when they exist, and regarded as two lateral petals.[2] Superposed to these two folioles are two epigynous stamens with free filaments and basifixed, erect, bilocular anthers, dehiscing by two longitudinal nearly marginal clefts. In the female flowers they are more or less completely aborted. The gynæcium, which totally or partly disappears in the male flower, is composed of an inferior unilocular ovary, surmounted by two stylary branches, subulate and charged with stigmatic papillæ. Near the top of the ovarian cell is inserted a single descending ovule,[3] with the micropyle superior and lateral to the placenta. The fruit is a small drupe with soft pulp,[4] and the putamen, crustaceous and fragile, contains one

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[1] L. *Gen.* n. 102.—J. *Gen.* 68; *Ann. Mus.* iii. 320, t. 30.—Lamk. *Ill.* t. 50.—Poir. *Dict.* viii. 117; Suppl. v. 369.—DC. *Prodr.* iii. 67.—Endl. *Gen.* n. 6137.—B. H. *Gen.* 675, n. 5.—H. Bn. *Payer Fam. Nat.* 377.—*Trixis* Mitch. *Eph. Cur. Nat.* (1748) n. 23, c. ic.—Gærtn. *Fruct.* i. 115, t. 24 (not P. Br.).

[2] Small, greenish or brownish.

[3] Torr. et Gr. *Fl. N.-Amer.* i. (1840) 528.—A. Gray, *Man.* ed. 5, 175.

[4] L. *Mantiss.* 16, 21; *Gen.* n. 1272; *Amœn.* vii. 495.—J. *Gen.* 405, 452.—Lamk. *Dict.* iii. 61;

Gunnera chilensis.

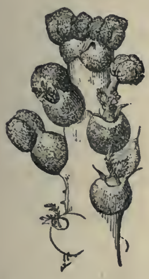

Fig. 473. Portion of inflorescence.

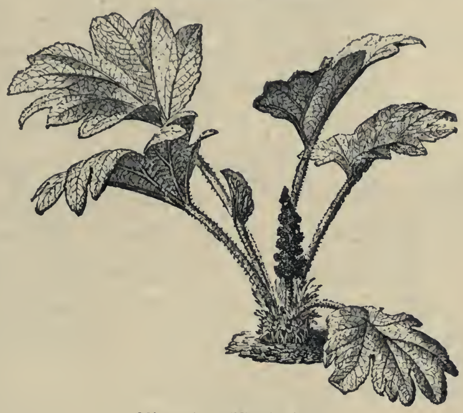

Fig. 472. Habit ($\frac{1}{12}$).

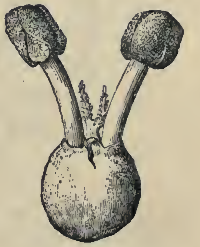

Fig. 474. Flower.

Suppl. ii. 863; *Ill.* t. 801.—ENDL. *Gen.* I. 1889. B. H. *Gen.* 676, n. 7.—H. BN. *Payer Fam. Nat.* 379; *Adansonia*, xii. 38.—A. DC. *Prodr.* xvi. sect. ii. 597.—*Perpensum* BURM. *Prodr. Fl. Cap.* 26.—*Panke* FEUILL. *Obs.* ii. t. 30.—*Misandra* COMMERS. ex J. *Gen.* 405.—*Disomene* BANKS et SOL. (ex FORST. *Comm. Gœtt.* ix. 45.—GAUDICH. *Freyc. Voy. Bot.* 512.—*Milligania* HOOK. F. *Hook. Ic.* t. 299.—*Pankea* ŒRST. *Pl. Nov. Centr.-Amer.* 6 (*Nat. For. Vid.* 1857). — *Pseudo-Gunnera* ŒRST. — *Gunneropsis* ŒRST. — *Misandropsis* ŒRST. *loc. cit.*

[1] Sometimes, however, trimerous.

[2] These would be sepals if the alternate teeth proceeded only from a marginal projection the receptacle. They are sometimes cucullate, and may also, doubtless, be three in number. (See *Adansonia*, xii. 38.)

[3] Anatropous or peritropous (?).

[4] In *G. chilensis*, the fruit of which ripens pretty well in our conservatories, the exterior membrane of the drupaceous fruit is orange-coloured.

descending seed. Its coats[1] cover an abundant fleshy albumen, at the summit of which is lodged a small embryo with short cotyledons and superior radicle. *Gunnera* consists of evergreen herbaceous plants, sometimes much developed, numbering some ten species, which inhabit southern and eastern Africa, tropical and cool oceania, and the Andean and antarctic regions of South America.[2] All the parts are often scabrid or hispid. The rhizome is thick and short or slender and creeping; it bears alternate leaves, called radicle, close, petiolate, sometimes accompanied by stipuliform bodies of variable appearance,[3] with limb entire, or crenelate, or lobed. The flowers are collected in spikes or compound clusters, the axis of which is slender or thick, simple or with numerous ramifications closely pressed together. In the monœcious species, the female flowers are most frequently at the lower part of the inflorescence, and the male above; each may also be accompanied by two lateral branches.

Gunnera perpensa.

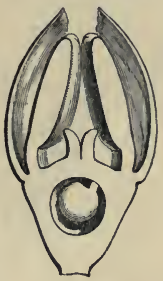

Fig. 475. Long. sect. of hermaphrodite flower ($\frac{5}{1}$).

VII. HIPPURIS SERIES.

Hippuris[4] (fig. 476–481) represents the lowest type of this group; for its flowers, hermaphrodite or polygamous and irregular, contain only a monandrous andrœcium and a gynæcium with a unilocular ovary. The receptacle is sacciform, like that of *Gunnera*, and its mouth is entire or slightly sinuous.[5] In the anterior part of the flower is inserted a stamen,[1] the erect and subulate filament of which supports a basifixed, bilocular, introrse anther dehiscing by two longitudinal clefts. The ovary, lodged in the cavity of the receptacle, is unilocular and surmounted by a slender, subulate style, charged with stigmatic papillæ. On the posterior wall of the ovarian cell, a little below the summit, is inserted a single descending anatropous ovule, with micropyle interior and superior.[2] The fruit is a drupe finally little fleshy, with crustaceous monospermous putamen. The seed contains under its coats a cylindrical embryo, with superior radicle, surrounded by a thin fleshy albumen. Of *Hippuris*, one or two species[3] are known, evergreen herbs, with rhizomes creeping in the mud. The aerial branches, simple, erect, are clothed with numerous verticils of linear entire leaves, the number in each verticil being variable.[4] The flowers are axillary, solitary and sessile. This genus has been found in the fresh and brackish waters of Europe, temperate and northern Asia, and northern and antarctic America.

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[1] Soft and purple in *G. chilensis*.

[2] R. et Pav. *Fl. Per.* i. t. 44.—Raoul, *Choix de Pl.* t. 8.—Benn. *Horsf. Pl. Jav. Rar.* 75, t. 15.—Bl. *Bijdr.* 513; *Mus. Lugd.-Bat.* ii. 100, 171.—Hook. f. *Fl. N.-Zel.* i. 66; *Man. N.-Zeal. Fl.* 67; *Fl. Tasm.* 125; *Fl. Antarct.* ii. 274.—C. Gay, *Fl. Chil.* ii. 362.—A. Gray, *Un. St. Exp. Exp. Bot.* i. 629, t. 78, 79.—Harv. and Sond. *Fl. Cap.* ii. 571.—Oliv. *Fl. Trop. Afr.* ii. 405.—Phil. *Ann. Sc. Nat.* sér. 4, vii. 90.—Hook. *Icon.* t. 489, 490.—*Bot. Mag.* t. 2376.—Walp. *Rep.* ii. 100; v. 672; *Ann.* vii. 941.

[3] Of uncertain nature.

[4] L. *Gen.* n. 11.—Retz. *Obs.* iii. 7, t. 1.—Adans. *Fam. des Pl.* ii. 566.—Hellen. *Diss. des Hippur.* Abo (1786).—J. *Gen.* 18; *Ann. Mus.* iii. 323, t. 30.—Lamk. *Ill.* t. 5.—Poir. *Dict.* Suppl. iv. 373.—Gærtn. *Fruct.* ii. 24, t. 84.—Reichb. *Iconogr.* t. 86.—DC. *Prodr.* iii. 71.—Turp. *Dict. Sc. Nat.* Atl. t. 220.—Nees, *Gen.* ii. fasc. 8, t. 14.—Spach, *Suit. à Buffon*, iv. 443.—Endl. *Gen.* n. 6134.—B. H. *Gen.* 675, n. 6.—H. Bn. *Payer Fam. Nat.* 378.—*Limnopeuce* Vaill. *Act. Acad. Par.* (1719), t. 1.—*Pinastella* Dill. *Nov. Gen.* 168.

[5] The marginal collar is especially prominent outside, under the stamen.

Hippuris vulgaris.

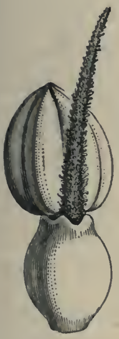
Fig. 477. Flower (☿).

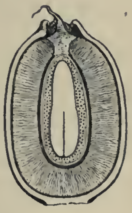
Fig. 481. Long. sect. of flower.

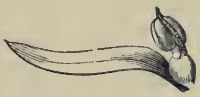
Fig. 476. Flower with axillate leaf.

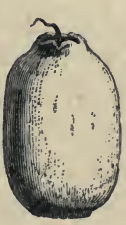
Fig. 480. Fruit.

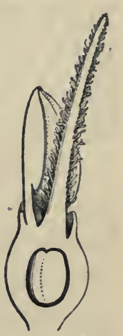
Fig. 479. Long. sect. of flower.

As here comprised, this family is one of those named by concatenation. Pretty well defined, in 1759, by B. DE JUSSIEU,[5] under the name of *Onagræ*, it was extended by ADANSON,[6] who recognized most

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[1] There are sometimes abnormal flowers which are diandrous (fig. 478).

[2] On the characters of this ovule and on embryogany, see UNG. *Bot. Zeit.* vii. 329.—TUL. *Ann. Sc. Nat.* sér. 3, xii. 67, t. 5.—HOFMEIST. *Ann. Sc. Nat.* sér. 4, xii. 65.

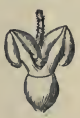
Fig. 478.

[3] C. GAY, *Fl. Chil.* ii. 355.—TORR. et GR. *Fl. N.-Amer.* i. (1840) 531.—BOISS. *Fl. Or.* ii. 754.—GR. et GODR. *Fl. de Fr.* i. 589.—BREW. et WATS. *Geol. Surv. Calif. Bot.* i. 215.—BOISS. *Fl. Or.* ii. 754.—WALP. *Rep.* ii. 98; *Ann.* vii. 941.

[4] From four to twelve.

[5] *A. L. J. Gen.* lxx.

[6] *Fam. des Pl.* ii. 81 (1763).

of its affinities in ranging with it, *Ludwigia*, *Epilobium*, *Circæa*, and *Trapa*, some *Myrtaceæ*, *Melastoma*, *Alangium*, and even some *Rubiaceæ*. A. L. DE JUSSIEU[1] extended it still further, but rendered it altogether heterogeneous by including in it some *Ternstræmiaceæ* as *Visnea*, some *Saxifragaceæ* as *Vahlia* and *Escallonia*, a part of the *Combretaceæ*,[2] some *Santalaceæ* as *Ophira*, *Santalum* and *Sirium*, with several *Myrtaceæ*, *Melastomaceæ* and the *Loaseæ* as allied genera. But he did not separate *Haloragis* (*Cercodea*), as did R. BROWN[3] in 1814, recognizing at the same time that the *Harolageæ* ought to be placed close beside the *Onagrarieæ*. His opinion was adopted by DE CANDOLLE,[4] who divided the *Onagrarieæ* into six tribes, one of which comprised the *Macræ*, and the *Halorageæ*, regarded as a distinct order,[5] itself divided into three tribes. The whole embraced twenty-four genera, from which must be withdrawn *Callitriche*, two doubtful genera, *Pleurostemon*[6] and *Onosuris*,[7] and five types doubly represented. The number of genera retained at this epoch numbered therefore only sixteen. In a series of observations, models of patient and exact analysis, SPACH,[8] recognizing the little homogeneity of the genera retained by DE CANDOLLE, thought it necessary to make a great number of divisions which might well be considered as so many distinct genera, but which we prefer to make only subgenera or sections, following the example of TORREY and A. GRAY,[9] BENTHAM and J. HOOKER,[10] and most others[11] who have recently been occupied with this group.

We retain twenty-four genera, comprising about eight hundred species, distributed over the whole world, but especially in the temperate regions. Only two of them, *Trapa* and *Loudonia*, are limited to the old world. *Haloragis* would be exclusively Asiatic and Oceanic had not one species been observed in the isle of Juan Fernandez. Nine other genera are common to both worlds; but there are some formed almost exclusively of American species, the most considerable being *Œnothera*. To America exclusively belong eleven genera, six of which are monotypes. All the *Lopezieæ* inhabit the south-west of North America and do not descend beyond Guatemala. *Hauya* and *Gongylocarpus* have been observed only in the warm parts of Mexico; *Heterogaura* and *Eucharidium* like *Zauschneria* are exclusively Californian. *Loudonia* and the section *Meionectes* of the genus *Haloragis* are all Australian. The aquatic types, such as *Hippuris* and *Myriophyllon*, ascend, on the contrary, to the cold regions of Europe, Asia, and North America. As far south as New Zealand the family is represented by *Haloragis*, *Gunnera*, and by the latter to antarctic America. *Trapa natans* exists in Denmark and in Siberia. *Myriophyllon* extends from the Azores and Algeria to the Orkney Isles and Sweden, and *Hippuris*, found in the Shetland Isles and Hebrides, exists also at the southern extremity of America. *Ludwigia* belongs to the warmest parts of America, Asia, and Africa, and by *Dantia palustris* (*Isnardia*), they extend from the Cape of Good Hope to the Faroe Isles and in America to Canada.

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[1] *Gen.* (1789) 317, Ord. 6; *Ann. Mus.* iii. 315.

[2] From which unfortunately the apetalous types have been removed as far as possible.

[3] *Flind. Voy.* 17; *Misc. Works* (ed BENN.), i. 21.

[4] *Mémoire sur la Famille des Onagrariées* (1829); *Prodr.* iii. 39, Ord. 74.

[5] *Op. cit.* 65, Ord. 77.

[6] RAFIN. *Journ. Phys.* lxxxix. 258.

[7] RAFIN. *loc. cit.*—*Pleurandra* RAFIN, *Fl. Lud.* 95 (not LABILL.). These are perhaps *Œnotheras* inaccurately observed, but it is impossible as yet to be certain; "there are some genera (ex TORR. et GR.) which cannot be recognized" (B. H. *Gen.* 787).

[8] *Monographia Onagrearum*, *Ann. Mus.* sér. 3, iv. 321; *Suit. à Buffon*, iv. 340 (1835); *Ann. Sc. Nat.* sér. 2, iv. 161, 270 (1835).

[9] *Fl. N.-Amer.* i. (1840) 486–531.

[10] *Gen.* 785, Ord. 70 (*Onagrarieæ*).

[11] LINDL. *Veg. Kingd.* (1846) 724, Ord. 278 (*Onagraceæ*).—ENDL. *Gen.* 1188, Ord. 265 (*Œnothereæ*).

The organs of vegetation in these plants present an infinite diversity of character, often according to the very different localities they inhabit; they are however nearly always herbaceous plants, annuals or evergreens, sometimes shrubs, but never in reality trees. Their organs of floration and fructification exhibit great variations, on the most important of which is based the following division into seven series:

I. ŒNOTHEREÆ.[1]—Flowers regular or nearly so. Ovarian cells multiovulate. Style entire or more or less divided at the summit. Fruit dry or fleshy. Seeds without albumen.—9 genera.

II. GAUREÆ.[2]—Flowers regular. Ovarian cells (complete or incomplete) uni- or biovulate. Ovules descending, with micropyle inferior and superior. Style not deeply divided or entire at stigmatiferous extremity, often indusiate at base. Seeds descending, solitary or few, with or without albumen.—2 genera.

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[1] *Onagreæ* DC. *Mém. Onagrar.* 2.—*Jussieæ* DC. *loc. cit.*—*Fuchsieæ* DC. *loc. cit.*—? *Montinieæ* DC. *loc. cit.* 1.

[2] *Gaureæ* ENDL. *Gen.* 1195, tribe 7.—*Œnothereæ* (part) SPACH, *Suit. à Buffon*, iv. 338.

III. Circeæ.[1]—Flowers regular, oftener irregular, 2–4-merous, with two fertile stamens. Ovules 1–∞, descending or ascending. Style simple. Fruit dry. Seeds without albumen.—4 genera.

IV. Trapeæ.[2]—Flowers regular, 4-merous, isostemonous. Ovules descending (ordinarily solitary), with micropyle interior and superior. Style simple, capitate at summit. Fruit dry, indehiscent, spinous. Seeds without albumen; embryo with two very unequal cotyledons. —1 genus.

V. Halorageæ.[3]—Flowers regular, 2–4-merous, hermaphrodite or polygamous, often small. Style with distinct branches, same in number as the ovarian cells to which they are superposed. Ovules solitary, descending, with micropyle interior and superior. Fruit finally dry, indehiscent. Seeds albuminous.—4 genera.

VI. Gunnereæ.[4] — Flowers regular, polygamous, small, 2–3-androus. Style with two branches. Ovule unilocular, uniovulate. Fruit drupaceous. Seed albuminous. Embryo very small.—1 genus.

VII. Hippurideæ.[5]—Flowers hermaphrodite or unisexual, monandrous (exceptionally 2-androus), unicarpellate. Style simple. Ovary unilocular, uniovulate. Fruit drupaceous, little fleshy, with monospermous putamen. Seed descending, with thin albumen.—1 genus.

Affinities.—The *Onagrariaceæ* might be defined as *Lythrariaceæ* with inferior and, as often said, adherent ovary. By this character they are also separated from the *Metastomaceæ* or at least from the greater part of them. By it they much resemble the *Myrtaceæ* and the *Rhizophoraceæ* with inferior ovary; but they have not the glands with odorous essence of the former; and when the latter have ovules definite in number, they are descending with the micropyle turned upwards and outwards. The partition separating the cells being more or less completely wanting in the *Onagrariaceæ*, they thereby approach the *Combretaceæ*, to which early writers, as we have seen, united them. But the descending ovules of the

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[1] DC. *loc. cit.* 2.—Endl. *Gen.* 1194, tribe 6.—*Circeaceæ* Lindl. *Synops.* (1829) 109.—*Lopezieæ* Spach, *Ann. Sc. Nat.* sér. 2, iv. 162.

[2] Endl. *Gen.* 1197.—*Hydrocaryes* DC. *Mém. Onagr.* 2.

[3] R. Br. *Flind. Voy.* ii. 549.—DC. *Prodr.* iii. 65, Ord. 72.—Endl. *Gen.* 1195, Ord. 266.—B. H. *Gen.* 673, Ord. 64.—*Hygrobiæ* Rich. *Anal. du Fruit*, 34.—*Cercodiaceæ* J. *Dict. Sc. Nat.* vii. 441.

[4] *Gunneraceæ* Endl. *Gen.* 285.—DC. *Prodr.* xvi. sect. ii. 596, Ord. 72.

[5] Link, *Enum.* i. (1821) 5.

Combretaceæ have also the micropyle exterior. It is so with the *Araliaceæ* which, in flower, would resemble the *Onagrariaceæ*. The *Cornaceæ*, whose ovules, definite in number, have the micropyle directed as in the *Halorageæ*, have not the divided style and they are nearly all woody with isostemonous flowers.[1]

USES.[2]—These are few; nearly all the *Onagrariaceæ* are without active properties. The greater part are gorged with a mucous juice. *Epilobium rosmarinifolium*[3] was considered emollient and slightly astringent; it was mostly applied externally. The ancients believed that the infusion of its root tamed wild animals and that its decoction in wine sweetened the temper and gladdened the heart. In the present day, the inhabitants of eastern Siberia and Kamtchatka are said to mix an infusion of this plant with an alcoholic drink prepared from the petioles of the great Cow-parsnip (*Heracleum Sphondylium*), which has a soothing effect. In Sweden the buds of this *Epilobe* are eaten as are also the young shoots prepared like asparagus. From tufts of the seeds a kind of thread is prepared in the polar regions. The same properties are attributed to *E. latifolium* and, in the north of Europe, to *E. tetragonum*.[5] *Circæa lutetiana*[6] (fig. 443–446) is also considered mucilaginous, resolutive; it is applied baked to hemorrhoids; its action appears nil. The *Œnotheræ* have rather variable qualities. *Onagra* or *Œnothera biennis*[7] (fig. 427–429), a species believed to have been brought from America to Europe a couple of centuries since, is a pot-herb the root of which is eaten baked with other vegetables or in salad, or preserved in vinegar with sugar. Other American species have an edible root, particularly *Œ. muricata*, *suaveolens*, *grandiflora*, and *parviflora*. In Brazil, *Œ.*

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[1] *Callitriche* has also been referred to this family; but to justify its admission, it must be supposed, I think, that the free ovary is surrounded by a receptacular sac, at the summit of which there is no calyx, or only, as some authors say, an *obsolete* one. It is an error to suppose that *Callitriche* has four uniovulate cells like *Haloragis*; they are only half cells; it has also only two stylary branches.

[2] ENDL. *Enchirid.* 638, 640.—LINDL. *Veg. Kingd.* (1846) 724.—ROSENTH. *Syn. Pl. Diaphor.* 906, 909.

[3] HÆNCK, *Jacq. Collect.* ii. 50.—GR. et GODR. *Fl. de Fr.* i. 583.—*E. angustifolium* LAMK. *Fl. Fr.* iii. 282.—*E. angustissimum* BERTOL.—*E. Dodonæi* VILL.—*Chamænerion palustre* SCOP.—*Lysimachia Chamænerion dicta angustifolia* C. BAUH.

[4] L. *Spec.* 494.—*E. frigidum* RETZ.

[5] L. *Spec.* 494.—SM. *Engl. Bot.* t. 1948.—*E. ramossimum* MŒNCH.

[6] L. *Spec.* 12.—DC. *Prodr.* iii. 63.—GREN. et GODR. *Fl. de Fr.* i. 586.—*C. major* LAMK. *Fl. Fr.* iii. 475.—*C. vulgaris* MŒNCH.

[7] L. *Spec.* 492.—ŒD. *Fl. Dan.* t. 446.—MILL. *Icon.* t. 189, fig. 2.—DC. *Prodr.* iii. 46, n. 4.—GREN. et GODR. *Fl. de Fr.* i. 584.

affinis, and in Chili *Œ. acaulis* and *mollissima* are reputed aperitive and vulnerary; the root is employed in the treatment of wounds. The *Ludwigias* are slightly astringent; some species of the section *Jussiæa* are employed in fomentations and cataplasms in America and tropical Asia. *L. diffusa*,[1] an Indian species, is an exception, its various parts being anthelminthic and diaphoretic. Its root is emetic; its leaves are administered in milk as anti-dysenteric; its seeds are given in honey against hooping cough; *L. perennis*[2] has all the same properties. The root of *L. erigata*[3] is considered a stimulant. *L. hirta*, *octonervia*, *octofila*, of India, *angustifolia* and *Blumeana*, of Java, have the same uses as *L. repens*,[4] the most known of the Asiatic species, common in Cochinchina, in India, and employed, mixed with castor-oil, in the treatment of scurf and other affections of the scalp. In the Antilles, *L. Swartziana* is recommended in the treatment of ophthalmia and wounds. *L. peruviana* is prescribed as reducing poultices for tumours and abscesses, especially on the glands. *L. pilosa* is used in Para as a potherb and for dyeing (yellow). *L. scabra* and *Caparosa* serve for dyeing black in Brazil; ink is sometimes made from them. In the United States, *L. alternifolia* is, on the other hand, known as an emetic. *Montinia acris*[5] has a fruit the pepper-like flavour of which is found, though in a less degree, in other parts of the plant; it is used at the Cape in diverse affections internal and external. The *Fuchsias* have berries, often small, but edible. Those of *F. excorticata*[6] have an agreeable perfume; they are said to be dainties with the New Zealanders; birds eat them in this country. The bark is said to be astringent and rich in gallic and tannic acids. *F. denticulata* and other American species have also fleshy and edible fruits. *F. coccinea*[7] (fig. 438) and *macrostemma* are slightly astringent; in Chili antiphlogistic decoctions are prepared from the branches and leaves and administered as refrigerants in cases of fever. *F. racemosa*[8] is considered, in the Antilles, a good remedy for various maladies of the digestive canal and the lymphatic system, intermittent fevers and blennorhœa. The *Gunneras* are also astringent plants; their juice becomes black when exposed to the air and stains iron a deep black. *G. chilensis*[1] (fig. 472–474) is employed in Peru to dress and dye skins. Its roots and leaves are useful as astringents, hemostatics, and antidiarrhœtics. The thick and fleshy petioles are used as vegetables. At the Cape *G. perpensa*[2] (fig. 475) is reputed stomachic, vulnerary; its stock is prescribed in dyspepsia and affections of the digestive canal and liver. In Java *G. macrocephala*[3] bears fruit esteemed as stimulant. The *Harolageæ* are little employed. In New Zealand, *Haloragis micrantha*[4] is noted for the odour of its leaves. In Europe and North America *Myriophyllon*, particularly *M. spicatum*[5] and *verticillatum*[6] (fig. 464) are considered antiphlogistic; the stock serves to polish soft wood. *Hippuris vulgaris*[7] (fig. 476–481) is held to be slightly astringent. *Trapa* formerly had the same reputation, especially *T. nutans*[8] (fig. 453–456), a species rather common in our fresh water, the embryo of which is eaten cooked or raw; its flavour is sweet or slightly astringent. It is said to be indigestible, but is nevertheless consumed in considerable quantity in the west of France. It is said to have been eaten by the ancient Thracians instead of bread, as it is now in a part of Sweden. In Limousin a boiled food is prepared from it not unlike a thick chestnut porridge. At Venice it is eaten as nuts. The stems and leaves, sometimes serving as fodder, are employed in reducing poultices. In China, especially around Canton, the fruit of *T. bicornis*[9] is used for food in the same way; at Saïgon that of *T. cochinchinensis*[10] is commonly sold in the markets. *T. bispinosa*[1] is cultivated in great quantity, for the same purposes, in the lakes of the valley of Cashmere, and *T. quadrispinosa*[2] in the waters of Silhet and the Indus. Many *Onagrariaceæ* are ornamental, especially the *Œnotheras*, among others those of the sections *Godetia*, *Boisduvalia*, esteemed as annuals, and the species with large white, pink, and yellow flowers, which often open only in the evening and exhale sometimes a sweet, sometimes a disagreeable odour. Some *Epilobes* are ornamental, and are planted on the banks of ornamental waters. *Myriophyllon*, *Hippuris* and *Trapa*, are used to furnish aquariums. Several species of *Gaura*, *Clarkia*, *Zauschneria*, the *Fuchsias* and *Lopezias*, the flowers of which are often very beautiful, and *Gunnera*, cultivated for the beauty of its foliage, are highly esteemed.

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[1] *Jussiæa diffusa* Forsk. *Descr. Fl. æg.-arab.* 210.—DC. *Prodr.* iii. 53, n. 8.

[2] L. *Spec.* ed. 2, 173.

[3] L. *Mantiss.* 40.—*L. triflora* Lamk. *Dict.* iii. 613.

[4] *Jussiæa repens* L. *Mantiss.* 381.—*J. adscendens* L. *Mantiss.* 69 ?—*Cubospermum palustre* Lour. *Fl. Cochinch.* (ed. 1790) 275 (*Rau jua*).

[5] See p. 469, note 3.

[6] L. f. *Suppl.* 217.—Lindl. *Bot. Reg.* t. 857.—Link et Ott. *Abb.* t. 46.—DC. *Prodr.* iii. 39, n. 26.—Hook. f. *Man. N.-Z. Fl.* ii. 75.—*Bot. Reg.* t. 857.—*Skinnera excorticata* Forst. *Prodr.* 163.

[7] Ait. *Hort. Kew.* ii. 8.—*Bot. Mag.* t. 97.—DC. *Prodr.* iii. 38.—*F. magellanica* Lamk.—*F. pendula* Salisb.—*Nahusia coccinea* Schnev.—*Skinnera coccinea* Mœnch.

[8] Lamk. *Dict.* ii. 565; *Ill.* t. 282, fig. 1.—Plum. ed. Burm. t. 133, fig. 1.—DC. *Prodr.* n. 18.

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[1] Lamk. *Dict.* ii. 61; *Ill.* t. 801 *a.*—Rosenth. *op. cit.* 909.—A. DC. *Prodr.* xvi. s. ii. 598.—*G. scabra* R. et Pav. *Prodr. Fl. Per.* i. 29, t. 44.—*G. pilosa* H. B. K. *Nov. Gen. et Sp.* ii. 24.—*Panke Anapodophylli folio* Feuill. *Obs.* ii. 741, t. 30 (*Pangue, Nalca*).

[2] L. *Mantiss.* 121.—Thunb. *Fl. Cap.* (ed. Schult.) 32.—Harv. and Sond. *Fl. Cap.* ii. 571. —DC. *Prodr.* n. 7.—*Bot. Mag.* t. 2376.—*Blitum Africanum Calthœ Palustris Folio* Pluk. *Phyt.* t. 18.—*Perpensum blitispermum* Burm. *Prodr. ap.* 26.

[3] Bl. ex Rosenth. *op. cit.* 909.

[4] R. Br.—Hook. f. *Man. N.-Zeal. Fl.* 66.—*H. tenella* Ad. Br.—*Goniocarpus citriodorus* A. Cunn. M. J. Hooker, and several other travellers however represent this species as absolutely inodorous.

[5] L. *Spec.* 1409.—Schkuhr, *Handb.* t. 296.—DC. *Prodr.* iii. 68, n. 1.—Gren. et Godr. *Fl. de Fr.* i. 588.—Rosenth. *op. cit.* 909.

[6] L. *Spec.* 1410.—DC. *Prodr.* n. 4.—Gren. et Godr. *Fl. de Fr.* i. 587.

[7] L. *Spec.* 3.—DC. *Prodr.* iii. 71, n. 1.—Gr. et Godr. *Fl. de Fr.* i. 589.—Rosenth. *op. cit.* 999.

[8] L. *Spec.* 175.—Schkuhr, *Handb.* t. 25.—Lamk. *Ill.* t. 75.—DC. *Prodr.* iii. 63, n. 1.—Gr. et Godr. *Fl. de Fr.* i. 589.—Rosenth. *op. cit.* 910.

[9] L. f. *Suppl.* 128.—DC. *Prodr.* iii. 64, n. 4. —*T. chinensis* Lour. *Fl. Cochinch.* (ed. 1790) 86.

[10] Lour. *loc. cit.*

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[1] Roxb. *Pl. Coromb.* t. 234; *Fl. Ind.* i. 449.—Rheede, *Hort. Malab.* ii. 64, t. 33.—*Shringata* Jones, *Asiat. Res.* ii. 350; iv. 253.

[2] Roxb. *Fl. Ind.* i. 451.—Rosenth. *op. cit.* 910.

GENERA.

I. ŒNOTHEREÆ.

1. **Œnothera** L.—Flowers hermaphrodite regular; receptacle tubular or clavate, sometimes long lageniform, enclosing adnate germen and produced above the apex of the latter either very slightly (*Godetia*, *Eulobus*, *Sphærostigma*), or to a less or greater length and there cylindrical or obconical and bearing perianth and stamens on upper margin. Sepals 4 (2 lateral), valvate, deciduous. Petals 4, alternate, sessile or very slightly unguiculate, obovate or obcordate; contorted in prefloration. Stamens 8, 2-seriate, the oppositipetalous oftener shorter; filaments free; anthers introrse, 2-rimose, short or oftener elongate. Germen inferior, crowned with an epigynous disk thin (or 0), sometimes rather thick; cells 4, oppositipetalous, complete or incomplete; style slender, at apex stigmatose globose or elongate, entire, 4-lobed or 4-partite; lobes elongate. Ovules in cells ∞, subhorizontal or ascending, 1–2-seriate, anatropous. Fruit erect or sometimes refracted (*Eulobus*), capsular, coriaceous or subligneous, oblong or clavate, 4- or polygonal, costate or sometimes broadly alate; wings vertical dorsal; 1–4-locular, 4-valvate above or for entire length; valves loculicidal, in the middle internally septiferous and solute from seminiferous columella; sometimes evalvate. Seeds ∞, often ascending, naked or appendiculate to chalaza; testa sometimes (*Blennoderma*) mucous; embryo exalbuminous slightly fleshy.—Herbs or rarely undershrubs; leaves alternate, sessile or petiolate, entire, dentate, lobate or pinnatifid; flowers axillary to leaves or bracts at top of twigs, sessile or pedicellate, solitary or more rarely 2-nate or few. (*Warm and temp. America*, *Tasmania.*) —See p. 461.

2 ? **Gayophytum** A. Juss.—Flowers (nearly of *Œnothera*) small or very small; tube of receptacle not or scarcely produced beyond

germen. Sepals and petals 4. Stamens 8, of which 4 oppositipetalous, sometimes sterile anantherous; anthers of fertile ones subglobose. Germen 2-locular; ovules in cells ∞, sub-1-seriate; style capitate or clavate at apex. Fruit capsular small linear; valves 4, of which 2 wider internally septiferous in the middle; but 2 narrower not seminiferous. Seeds ∞, ascending, externally smooth or papillose.—Slender annual herbs; leaves alternate linear entire subenervate; flowers (small) axillary solitary, very shortly pedicellate. (*Warm west. parts of both Americas.*)—See p. 465.

3. **Ludwigia** L.—Flowers (nearly of *Œnothera*) 3–5-merous; receptacle cylindrical or turbinate, not produced beyond germen. Petals entire, 2-lobed, or 0. Stamens twice as many as petals (*Jussiœa*); the oppositipetalous smaller, sometimes effete or rudimentary; or equal in number and alternipetalous; filaments rather short inserted under margin or between lobes of epigynous disk. Fruit capsular, septicidal or rarely membranous, indehiscent, sometimes dehiscing by apical pores; ribs of valves often dilacerate or irregularly divided.—Herbs or rarely undershrubs or shrubs; leaves alternate or opposite; stipules sometimes minute or glanduliform; leaves axillary solitary or in short terminal racemes; bracteoles 2 lateral, inserted at greater or less height on the pedicel or germen. Other characters of *Œnothera.* (*All trop. and temp. regions.*)—See p. 465.

4. **Clarkia** Pursh.—Flowers (nearly of *Œnothera*) 4-merous; receptacle produced shortly above ovary (*Euclarkia*) or long in narrow cylinder (*Eucharidium*). Sepals 4, deciduous. Petals same in number unguiculate, entire (*Phœostoma*) or oftener 3-lobate. Stamens 8, inserted in throat of receptacle, 2-seriate; the oppositipetalous smaller or rudimentary; anthers deformed or evanescent; filaments of fertile alternipetalous ones sometimes enlarged interiorly at base by elongate process of disk. Disk annular epigynous and surrounding base of style. Germen 4-locular; ovules ∞. Fruit capsular coriaceous, loculicidally 4-valvate; valves septiferous in middle, oftener solute from columella. Seeds ∞, ascending; punctate or papillose, sometimes marginate. Other characters of *Œnothera.*—Annual herbs; leaves alternate elongate, entire or denticulate; flowers axillary solitary, sometimes (from leaves being changed to bracts) terminally spicate. (*North-west. America.*)—See p. 466.

5. **Zauschneria** Presl.—Flowers (nearly of *Clarkia*) 4-merous; receptacle 4-gonal, above germen adnate within suddenly infundibu-

liformly dilated. Squamules 4, interior to receptacle, of which 4 deflexed oppositipetalous, and 4 erect alternate. Sepals 4, valvate. Petals as many obovate, 2-lobate. Stamens 8, 2-seriate; anthers introrse, not revolute. Germen 4-locular, ∞ -ovulate; style at apex stigmatose capitate, 4-lobed. Fruit capsular; cells 4 (complete or incomplete); valves septiferous within, solute from columella. Seeds ∞, oblong, at apex (to chalaza) long hairy.—A small ramose shrub; leaves alternate (or the lower subopposite) sessile elongate, entire or denticulate; flowers axillary solitary. (*California.*)—See p. 467.

6. **Epilobium** L.—Flowers nearly of *Clarkia* (or *Œnothera*) 4 merous, sometimes subirregular (*Chamœnerium*); receptacle not or very slightly produced beyond germen. Sepals 4, valvate, deciduous. Petals as many, obovate or obcordate. Stamens 8, sometimes deflexed (*Chamœnerium*). Germen 4-locular; ovules ascending, 2-seriate; style slender, at apex stigmatose 4-lobed, sometimes clavate and finally expanded fimbriate (*Crossostigma*). Capsule loculicidal and seeds long hairy to chalaza (of *Zauschneria*).—Undershrubs or herbs; leaves alternate and opposite, entire or dentate; flowers axillary solitary or in terminal spikes or racemes. (*All cold and temp. regions.*)—See p. 467.

7. **Hauya** Moç. & Sess.—Flowers (nearly of *Œnothera*) 4-merous; receptacle cylindrical enclosing adnate germen and produced above to infundibuliform tube. Sepals 4 coriaceous, valvate. Petals 4, sessile, contorted or imbricate. Stamens 8, 2-seriate; filaments subulate, anthers elongate, introrse, at base aristate-appendiculate. Germen 4-locular; style long erect cylindrical, at apex stigmatose subglobose scarcely lobate. Ovules in cells ∞, ascending. Fruit oblong woody capsular, loculicidal; valves 4, septiferous within at middle, thick strong recurved, solute from 4-winged seminiferous columella. Seeds ∞, ascending, above alate imbricate; cotyledons of exalbuminous embryo oblong fleshy compressed.—A tomentose shrub; leaves alternate petiolate, ovately oblong entire, whitish beneath; flowers axillary solitary sessile. (*Mexico.*)—See p. 469.

8 ? **Montinia** L. f.—Flowers diœcious 4–5-merous; receptacle of male flower short. Sepals short, dentiform, not contiguous, persistent. Petals much longer rather fleshy, highly imbricate, deciduous (in female flower 0). Stamens 4, 5, inserted under central thickly cupular disk; filaments thick subulate, apically inserted within connective; anthers oblong, finally extrorse, 2-locular, 2-rimose, recurved after

dehiscence. Receptacle of female flower very concave oblong, enclosing germen and not produced beyond. Sepals and petals (of males) epigynous. Stamens 4, 5, inserted with petals, conformed to those of males but smaller and sterile (?), sometimes rudimentary (or 0 ?). Disk epigynous rather thick, 4–5-gonal. Germen inferior; style short thick, 2-fid; branches at dilated apex widely reniform-discoid papillosely stigmatose. Ovules in 2 cells (complete or incomplete) ∞, 2-seriate. Fruit capsular subligneous oblong-clavate; valves 2, finally solute from seminiferous columella. Seeds ∞, oftener few, imbricate, marginately alate and 2-auriculate at base; testa papillose; cotyledons of exalbuminous embryo flat, straight or curved; radicle thick short.—A glabrous shrub, thickly branched; branches sulcate; leaves alternate petiolate, sublanceolate entire acuminate veinless; male flowers in terminal corymbiform racemes (?); female solitary. (*Cape of Good Hope.*)—See p. 469.

9. **Fuchsia** PLUM.—Flowers hermaphrodite, sometimes polygamous (nearly of *Hauya*), 4-merous; receptacle around adnate germen globose or ovoid, produced above to cylindrical, obconical, infundibuliform or campanulate tube (coloured). Sepals 4, continuous with tube (coloured), valvate, deciduous with receptacle. Petals 4 (sometimes 0), inserted in throat of receptacle, patent or reflexed; contorted in prefloration. Stamens 8, 2-seriate; filaments slender; anthers oblong or linear, oftener exserted. Germen inferior, 4-locular; style slender elongate, at apex capitate or obovoid entire or 4-lobed stigmatose. Ovules ∞, ∞-seriate. Fruit baccate, often pulpy, crowned with scar of receptacle. Seeds ∞, sometimes few angular or reniform; testa membranous; embryo rather fleshy.—Small trees, shrubs or undershrubs; leaves alternate or opposite, sometimes verticillate, entire or dentate; flowers axillary solitary or cymose, sometimes in simple compound or cymiferous terminal racemes; pedicels long, often slender, nutant. (*Both warm and temp. Americas.*)—See p. 469.

II. GAUREÆ.

10. **Gaura** L.—Flowers hermaphrodite regular; receptacle long clavately lageniform, produced above germen adnate within to tubular sometimes curved neck. Sepals 4, more rarely 3, valvate, deflexed,

deciduous. Petals 4, more rarely 3, alternate, inserted in incrassate glandulose throat, equal or slightly unequal. Stamens double the petals in number, 2-seriate; filaments free, declinate, sometimes increased within at base by a scale of varying shape (a process of the disk); anthers linear-oblong, introrse. Germen inferior, 4- or more rarely 3-locular; cells complete or oftener incomplete; style slender, oftener deflexed, at apex stigmatose 4-lobed or 4-partite and girt with an annular or obconical indusium. Ovules in cells 1, 2, descending; funicle rather long; micropyle at first superior and introrse. Fruit 3–4-gonal, incompletely 3–4-locular, woody, coriaceous or slightly drupaceous, at apex sometimes 3–4-fissus. Seeds 1, or few, descending; testa membranous; albumen oftener scanty fleshy; cotyledons of rather thick embryo straight, undulate or complicate. —Perennial or annual herbs, sometimes subshrubby, glabrous or pilose; leaves alternate, petiolate or sessile, entire or dentate; flowers in terminal sometimes capitate racemes or spikes. (*Warm North America.*)—See p. 471.

11 ? **Heterogaura** ROTHR.—Flowers nearly of *Gaura* (smaller); receptacle obconical, scarcely produced above germen. Sepals 4, valvate. Petals 4, unguiculate. Stamens 8–10, not appendiculate at base, in pairs or singly opposite sepals and petals; the oppositipetalous often sterile; anthers cordato-lanceolate effete; anthers of fertile alternipetalous ovate subcordate. Germen 4-locular; style simple, at apex stigmatose dilated, not indusiate. Ovules in cells 1 (of *Gaura*). Fruit ovoid gibbous, 2–4-locular, by abortion 1–2-spermous. Other characters of *Gaura*.—An erect annual herb; leaves alternate; the lower petiolate, entire or sinuate; flowers in terminal racemes. (*California.*)—See p. 472.

12. **Gongylocarpus** CHAM. and SCHLCHTL.—Flowers 4-merous; receptacle at base enclosing adnate germen and there adnate to branch or leaf, above germen far produced to slender cylindrical tube. Sepals 4, inserted at top of tube, valvate. Petals same in number alternate, contorted. Stamens 8, 2-seriate; the 4 oppositipetalous shorter; anthers ovate introrse. Germen 2–3-locular; style thin girt at base with epigynous disk, at apex stigmatose capitate. Ovules in cells 1, descending; micropyle introrsely superior, finally lateral. Fruit subdrupaceous adnate to branch and petiole, turbinate or subglobose, finally dry; putamen 2–3-locular. Seed exalbuminous; cotyledons of straight embryo flat; radicle superior.—An annual

herb; stem and branches reddish or plum-coloured; leaves alternate petiolate ovately lanceolate denticulate; flowers axillary solitary or in terminal few-flowered uniparous spikelike cymes. (*Mexico.*)—See p. 472.

III. CIRCEÆ.

13. **Circæa** L.—Flowers hermaphrodite regular, 2-merous; receptacle sacciform ovoid, enclosing adnate germen and produced shortly above. Sepals 2, lateral, inserted at top of receptacle, valvate, finally reflexed. Petals 2, alternate with sepals, imbricate or contorted in prefloration. Stamens 2, alternipetalous, epigynous; filaments slender; anthers short; cells introrse or submarginal, rimose. Germen 1–2-locular; cells lateral; style slender, at apex stigmatose subclavate or capitate, shortly 2-lobed. Ovules in cells 1 (or rarely 2), ascending, incompletely anatropous; micropyle extrorsely inferior. Fruit ovoid coriaceous, indehiscent, uncinato-setose without, 1–2-locular. Seeds in cells solitary, laterally inserted within; cotyledons of exalbuminous embryo fleshy flat compressed, radicle short inferior.—Glabrous or pilose perennial herbs; stem simple or slightly ramose; leaves alternate petiolate ovate denticulate; flowers in terminal and lateral racemes, simple or slightly ramose; pedicels patent, often finally deflexed, bracteate or ebracteate. (*Europe, temp. and frigid North America.*)—See p. 473.

14. **Diplandra** Hook. and Arn.—Flowers subregular, 4-merous; receptacle globose at base and produced above to curved cylindrical tube. Sepals 4, inserted at top of receptacle, valvate, deciduous (coloured). Petals 4, alternate, unequal, imbricate. Stamens 2, epigynous, superposed anteriorly and posteriorly to sepals; filaments free; anthers oblong introrse, 2-rimose. Germen inferior, 4-locular; cells oppositipetalous; style simple, at apex stigmatose truncate. Ovules in cells solitary, descending; micropyle introrsely superior. Fruit capsular coriaceous subglobose, loculicidally 4-valvate; valves solute from 4-winged seminiferous axis. Seeds compressed widely alate; testa papillose; cotyledons (immature) of exalbuminous (?) embryo flat.—A pubescent shrub; leaves opposite and alternate subsessile ovately oblong; flowers in a terminal raceme; peduncles long. (*Mexico.*)—See p. 474.

15. **Lopezia** Cav.—Flowers nearly of *Diplandra*; sepals 4, valvate. Petals 4, unequal, imbricate; the 2 posterior narrower, glandular within above claw. Stamens 2, epigynous; the anterior sterile petaloid free or occasionally adnate with style and receptacle (*Semeiandra*); the posterior fertile; filament free subulate or (*Semeiandra*) highly gynandrous; anther introrse, or more rarely subextrorse, 2-rimose. Germen inferior subglobose or obconical, 4-locular, sometimes crowned with minute disk; style, etc., of *Diplandra*. Ovules in cells ∞, ∞-seriate in internal angle. Fruit capsular subglobose, from apex loculicidally 4-valvate; valves solute from seminiferous columella. Seeds ∞, obovoid (sometimes joined in pairs); testa rugose granulate; embryo exalbuminous.—Glabrous or pubescent herbs; leaves alternate or partly opposite, petiolate, dentate; flowers in long or short racemes at top of twigs; pedicels slender. (*Mexico, Guatemala.*)—See p. 474.

IV. TRAPEÆ.

16. **Trapa** L.—Flowers hermaphrodite, 4-merous; receptacle cupular, enclosing adnate base of germen (in great part free). Sepals 4, valvate (or lateral a little exterior), persistent, sometimes spinescent at apex. Petals 4, inserted at base of subepigynous undulate or obtusely lobate disk, sessile, undulate, imbricate or more rarely contorted. Stamens 4, inserted alternately with petals; filaments subulate; anthers ovately oblong introrse, 2-rimose. Germen in great part free (at base only inferior) attenuated to slender style capitate at stigmatose apex; cells 2, lateral. Ovules in cells solitary, descending; micropyle introrsely superior. Fruit stipate with adnate calyx and receptacle turbinate coriaceous, ligneous or subosseous; stipate to middle with 2–4 spinescent incrassately indurate sepals and from base to apex with style, indehiscent, by abortion 1-spermous. Seed large descending; testa membranous adnate spongy above; cotyledons of incurved exalbuminous embryo unequal; one abortive minutely squamiform; the other very large fleshy; radicle superior (in germination perforating apex of seed and fruit).—Floating herbs; rhizome elongate; leaves 2-form; the lower submerged opposite rootlike pinnatisect; the upper emerged floating rosulate, petiole inflated spongy, limb rhomboid dentate; flowers

axillary solitary, shortly and thickly pedunculate. (*Europe, warm and temp. Asia and Africa.*)—See p. 476.

V. HALORAGEÆ.

17. **Haloragis** Forst.—Flowers hermaphrodite or polygamous; receptacle concave turbinate or conical, in male flower less concave 4–8-costate or angular. Sepals 4, inserted in mouth of receptacle, sometimes decurrent or subpeltate, or more rarely 2 (*Meionectes*), valvate. Petals same in number, alternate, concave or cucullate, sessile or unguiculate, imbricate or tortuous (sometimes 0). Stamens double the number of petals, 2-seriate; filaments short filiform; anthers oblong or linear, often 4-gonal, introrsely or laterally 2-rimose. Germen (in male flower rudimentary or effete) adnate to receptacle within inferior; cells 2–4, complete or incomplete; styles equal to number of cells, stigmatose or plumose at apex and within. Ovules in cells solitary descending; micropyle introrsely superior. Fruit drupaceous slightly fleshy or nutlike, indehiscent, angular or alate, 1–4-locular. Seeds 1–4, descending; testa membranous; albumen fleshy more or less copious; cotyledons of axile subcylindrical embryo short or very short; radicle superior terete.—Herbs, sometimes subshrubby at base, ramose; leaves opposite and alternate, entire or serrate, minutely stipulate (?); flowers in racemose terminal spikes, sometimes pendulous; bracts 1–florous or cymiferous; bracteoles 2 or 0. (*Australia, New Zealand, warm south-east. Asia, Juan Fernandez.*)—See p. 477.

18 ? **Loudonia** Lindl.—Flowers nearly of *Haloragis* (larger); receptacle 2–4-pterous. Sepals and petals alternate induplicately cucullate 2–4. Stamens 4–8 (or 12 ?), 2-seriate; filaments short erect, persistent. Germen imperfectly 2–4-locular or finally 1-locular; styles 2–4, stigmatose at oblique apex; ovules 2–4, inserted under apex, descending. Fruit 2–4-alate or 2–4-gonal subclavate coriaceous, 1-spermous. Seed richly albuminous; radicle of axile embryo elongate.—Glabrous perennial herbs (turning black or green when dry); rhizome woody; branches erect robust often simple; leaves alternate line r entire subfleshy; flowers in terminal compound cymiferous corymbs. (*South Australia.*)—See p. 479.

19. **Myriophyllon** Vaill.—Flowers monœcious or polygamous, 4-merous; receptacle in males slightly, in females very concave, 4-sulcate. Sepals 4, or more rarely 2. Petals 2–4, imbricate (in female flower smaller). Stamens 2–4 or 6–8, 2-seriate; anthers elongate basifixed, laterally 2-rimose (in female flower sterile, rudimentary or 0). Germen entire, 2–4 locular, in male flower very short effete or 0); styles as many short, generally recurved, plumose at apex. Ovules in cells 1, more rarely 2, descending; raphe dorsal. Fruit nutlike or drupaceous; flesh scanty; putamen crustaceous. Seeds oblong; testa membranous; albumen copious fleshy; embryo axile cylindrical.—Glabrous aquatic herbs; branches often floating; leaves alternate, opposite or verticillate, entire or dentate, serrate or pectinately pinnatifid; flowers in axils of leaves sessile or shortly pedicellate, sometimes in terminal bracteate spikes; the lower female; the upper male; the intermediate often hermaphrodite. (*All warm and cold aquatic regions.*)—See p. 480.

20. **Serpicula** L.—Flowers (nearly of *Myriophyllon* or *Haloragis*) monœcious; receptacle of males very short. Sepals 4 and petals same cucullate or concave. Stamens 8. Rudiment of gynæcium short; styles 4, more or less developed. Receptacle of female flower sacciform subovoid; sepals 4 and petals same. Stamens rudimentary or 0. Gynæcium, fruit, seeds, etc., of *Haloragis.*—Low creeping or decumbent branched herbs; leaves opposite and alternate, subsessile entire or dentate; flowers (minute) axillary glomerulate; females sessile; males few or 1, long pedicellate. (*Africa, trop. marshy Asia and America.*)—See p. 481.

21. **Proserpinaca** L.—Flowers hermaphrodite (nearly of *Haloragis*), 3–4-merous, apetalous, 3–4-androus. Germen 3–4-locular; styles, ovules, fruit, etc., of *Haloragis* (or *Myriophyllon*).—Glabrous aquatic herbs; stem decumbent at base; leaves alternate lanceolate dentate or pectinately pinnatifid; flowers (minute) axillary, solitary or glomerulate. (*Warm North America, Antilles.*)—See p. 482.

VI. GUNNEREÆ.

22. **Gunnera** L.—Flowers hermaphrodite or monœcious; receptacle concave obovoid or compressed, enclosing adnate germen.

Sepals (?) 2, 3, dentiform, unequal or equal, sometimes scarcely perceptible. Petals (?) 2, lateral, longer membranous, concave or cucullate (sometimes 0). Stamens 2, opposite to petals (or more rarely 1, 3); filaments erect short, sometimes strong; anthers basifixed oblong; cells 2, laterally rimose. Germen inferior, 1-locular; styles 2, subulate or capitate, richly papillose. Ovule 1, laterally inserted under apex of cell, descending, anatropous or (?) peritropous. Fruit drupaceous or coriaceous; subglobose or 3-gonal; putamen crustaceous. Seed descending; testa thin; albumen copious farinaceous; embryo minute subapical.—Perennial herbs, scapiferous, glabrous or hispid or scabrous; rhizome often thick creeping; leaves alternate, all radical, appendiculate stipuliform sometimes intermixed; petiole often thick; limb ovate, suborbicular or cordato-rotundate, sometimes subflabelliform, simple or lobed, often coriaceous fleshy rugose; nerves strong; flowers (very small) either spicate, or densely crowded on the twigs of a thick compound branch, 2-bracteolate; inflorescence 1- or oftener 2-sexual; male flowers above. (*South. and east. Africa, Java, Oceania, Juan Fernandez, Andean South America.*)—See p. 482.

VII. HIPPURIDEÆ.

23. **Hippuris** L.—Flowers hermaphrodite or more rarely polygamous; receptacle concave ovoid or subglobose, mouth entire or unequally crenulate. Perianth 0. Stamen 1 (very rarely 2), epigynous, anteriorly inserted at top of receptacle; filament erect subulate; anther ovate basifixed, introrsely 2-rimose. Germen inferior, adnate to receptacle within, 1-locular; style subulate, entirely stigmatose. Ovule 1, inserted under apex of cell, descending; micropyle introrsely superior. Fruit ovoid drupaceous, slightly fleshy; putamen hard. Seed 1, descending, embryo slightly fleshy fatty; radicle of straight axile terete embryo superior.—Glabrous aquatic perennial herbs; rhizome turfy creeping; branches erect thick simple; leaves verticillate (4–12-nate) narrow linear entire; flowers (very small) axillary solitary sessile. (*Europe, temp. and north. Asia, north. and antarctic America.*)—See p. 484.

LIX. BALANOPHORACEÆ.

This family, the limits of which have been greatly extended, owes its name to the genus *Balanophora*[1] (fig. 482–485), in which the gynæcium much resembles, in its organization, that of *Hippuris*. The flowers are unisexual, monœcious, or diœcious. In the males (fig. 482–485), the perianth has from three to six[2] and often four valvate divisions,[3] above which the receptacle is produced in a small column which bears extrorse anthers. They are either the same in number as the parts to which they are superposed, or rarely in much greater number.[4] They have two cells of variable form, dehiscing by two clefts.[5] The female flower (fig. 484–485) is naked; it consists of a free, stipitate ovary, attenuated to a simple and entire

Balanophora dioica.

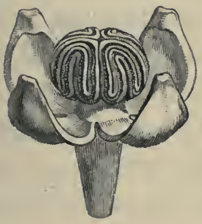

Fig. 483. Male flower.

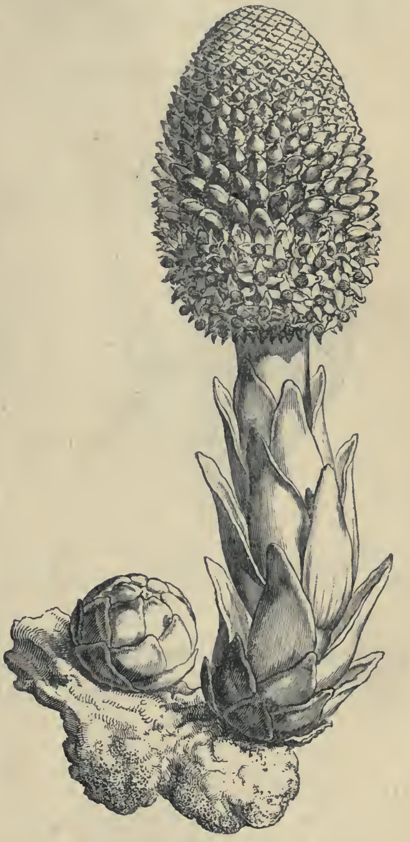

Fig. 482. Habit (male).

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[1] Forst. *Char. Gen.* t. 50.—J. *Gen.* 445.—Lamk. *Dict.* i. 355; *Ill.* t. 742.—L.-C. Rich. *Mém. Mus.* viii. (1822) 424.—Gœpp. *Balanophor.* 29, t. 1–3.—Endl. *Gen.* n. 718.—Griff. *Trans. Linn. Soc.* xx. 93, t. 3–6.—Wedd. *Ann. Sc. Nat.* sér. 3, xiv. 163.—Hook. f. *Trans. Linn. Soc.* xxii. 44, 426, t. 4–8, 75 B.—Eichl. *Act. Congr. Bot. Par.* (1867) 138, t. 1, fig. 1, 2; *DC. Prodr.* xvii. 103, 321.—*Cynopsole* Endl. *Gen.* n. 719.—*Sarcocordylis* Wall. *Herb.* n. 7249.

[2] Rarely two.

[3] Sepals (?) or petals (?).

[4] From 10 to 30 in *B. polyandra* Griff.

[5] Transverse, or longitudinal, or hippocrepiform. The pollen is formed of globular, sub-3-gonal seeds, bearing three warty prominences,

style. In the single cell of the ovary is a parietal and superior placenta supporting a descending, anatropous ovule, reduced to a nucule.[1] The fruit is drupaceous with a fleshy layer generally very thin, monospermous putamen, and the seed filling the cavity of the latter consists of an abundant oily albumen, in the upper portion of which is lodged a very small embryo.[2]

Balanophora consists of fungiform fleshy and parasitical plants[3] of very peculiar habit. They have a simple, lobed or ramified tuberous rhizome, often sprinkled with star-lobed prominences from which spring the aerial branches, coloured yellow or red and covered with scaly bracts, alternate, or opposite and connate, with parallel nervures; terminated by a cylindro-conical, claviform or globular floriferous receptacle, clothed with flowers[4] of one (fig. 482) or both sexes. In the latter case, the males are below, and the females above, much more numerous and smaller. The males are pedicellate, often reflexed and accompanied with axillate bracts. The females are in small spikes often terminating in an enlarged, globular or claviform body.[5] A dozen[6]

Balanophora fungosa.

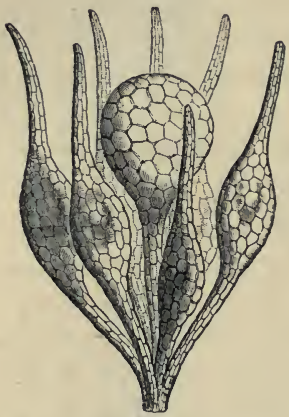

Fig. 484. Female flowers.

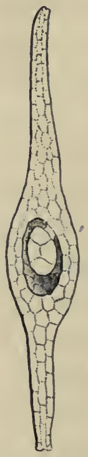

Fig. 485. Long. sect. of female flower.

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sometimes little developed, with the exterior coat smooth.

[1] Suspended by a unicellular funicle, it is composed of a nucule formed of a small number of cellules. (On the structure of the gynæcium see Hofmeist. *Pringsh. Jahrb.* i. 110, t. 18; *N. Beitr.* 585, t. 14, 15; *Ann. Sc. Nat.* sér. 4, xi 49, t. 5, 6, fig. 48–56.)

[2] It is formed of a very small number of cellules (often two or three).

[3] On the roots of very various trees (*Acer*, *Quercus*, *Hibiscus*, *Ficus* (?), *Eucalyptus*, *Vireya*, *Thibaudia*, *Araliaceæ*, etc.).

[4] Yellow or red.

[5] It has been considered as the summit of the secondary axis, and the name of *spadicel* has been given to it (Eichler).

[6] W. *Spec.* v. 177 (*Cynomorium*).—Bl. *Enum. Pl. Jav.* i. 87.—Schott et Endl. *Melet.* 12.—Jungh. *Nov. Acta Acad. Nat. Cur.* xviii. Suppl. i. 203, t. 1, 2.—Royle, *Ill. Pl. Himal.* 330, t. 99.—Thw. *Enum. Pl. Zeyl.* 293.—Arn. *Hook. Icon.* t. 205, 206 (*Langsdorffia*).—Ung. *Ann. Wien. Mus.* ii. t. 2.—Becc. *Att. Soc. Ital. Sc. Nat. Mil.* xi. 197; *N. Giorn. Bot. Ital.* i. 65, t. 2–4.—Benth. *Fl. Austral.* vi. 232.

species of *Balanophora* have been distinguished, found in the warm regions of Asia and Oceania.[1]

Sarcophyte sanguinea.

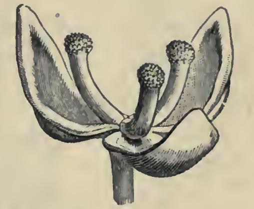

Fig. 486. Male flower ($\frac{5}{1}$).

Sarcophyte sanguinea,[2] a red and fleshy plant, growing at the Cape, parasitic on the roots of *Ekebergia* and *Acacia*, would appear to have the same general organization as *Balanophora*, but for its much flatter gynæcium and its ovary being sometimes uniovulate, sometimes bi- or triovulate. The male flower (fig. 486) is composed of three or four valvate sepals and an equal number of superposed stamens, inserted in the centre of the flower, formed of a thick free filament and a capitate multiovulate anther, dehiscing by a great number of small pores.[3] Its male flowers are solitary and its female united in rounded capitules.

Mystropetalon[4] has also a perianth formed of three folioles. In the male flower they are quite united at the base, and the two posterior are so to a greater height. Their prefloration is valvate and the posterior is smaller than the two others. The andrœcium is formed of three stamens superposed to the divisions of the perianth; but the anterior is sterile, rudimentary or even entirely absent, whilst the two posterior have anthers with two cells, each divided into two cellules, dehiscing by two longitudinal clefts.[5] In the centre is a rudimentary ovary. In the female flower, the ovary is inferior, surmounted by a long slender style and a superior, tubular or urceolate, trilobed and caducous perianth. This ovary is organized like that of *Sarcophyte*, and becomes a dry or scarcely drupaceous fruit, the single seed of which encloses a cellulose oily albumen and a small apical embryo. Two (?) species[1] of *Mystropetalon* are distinguished, fleshy plants of the Cape of Good Hope, parasitic, coloured,[2] with branches covered with scales and terminated by spikes of which the male flowers occupy the summit and the female the base.

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[1] *Dactylanthus Taylorii* (Hook. f. *Trans. Linn. Soc.* xxii. 425, t. 75, fig. A; Eichl. *Prodr.* 149), a plant growing parasitically on the beech and *Pittosporum* of New Zealand appears to resemble *Balanophora* and also *Langsdorffia*. It has naked male flowers, reduced to one or two stamens with bilocular anthers, and female flowers formed of an ovary surmounted by two or three narrow scales and a filiform style, with obtuse stigmatic summit. The flowers are diœcious, and the inflorescences are divided into numerous small catkins forming a sort of terminal corymb. The internal organization of its gynæcium and fruit are unknown.

[2] Sparm. *Kongl. Vet. Ak. Handl. Stockh.* xxvii. (1776) 300, t. 7.—Schott et Endl. *Melet.* 11.—Endl. *Gen.* n. 714.—Griff. *Trans. Linn. Soc.* xix. 338, t. 38.—Wedd. *Ann. Sc. Nat.* sér. 3, xiv. 173, t. 10, fig. 34–38.—Hofmeist. *N. Beitr.* i. 581, t. 13; *Ann. Sc. Nat.* sér. 4, xi. 45, t. 4, 5, fig. 43–47.—Eichl. *Act. Congr. Par.* (1867) 138, t. 2, fig. 21, 22; *Prodr.* 126.—Hook. f. *Trans. Linn. Soc.* xxii. 37, t. 1 C.—Tratt. *Arch.* i. 89; *Thes.* 90.—Harv. *Gen. S.-Afr. Pl.* 300.—Harv. and Sond. *Fl. Cap.* ii. 574.—*Ichthyosma Wehdemanni* Schlchtl, *Linnæa*, ii. 671, t. 8; iii. 194.

[3] The pollen grains are globular, smooth, and have three pores.

[4] Harv. *Ann. and Mag. Nat. Hist.* i. ser. ii. 385. t. 19, 20; *G. S.-Afr. Pl.* 418.—Endl. *Gen.* Suppl. i. n. 717^{1}.—Griff. *Trans. Linn. Soc.* xix. 336.—Hook. f. *Trans. Linn. Soc.* xxii. 31, t. 1 B. —Eichl. *Act. Congr. Par.* (1867) t. 1, fig. 10; *Prodr.* 124.—*Blepharochlamys* Presl. *Epim.* 245. —? *Scybalium* Harv. *Gen. S.-Afr. Pl.* 315 (not Schott and Endl.).

[5] Pollen subcubical, tubercular.

Cynomorium coccineum.

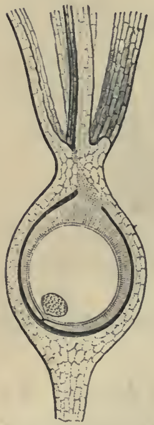

Fig. 488. Long. sect. of fruit.

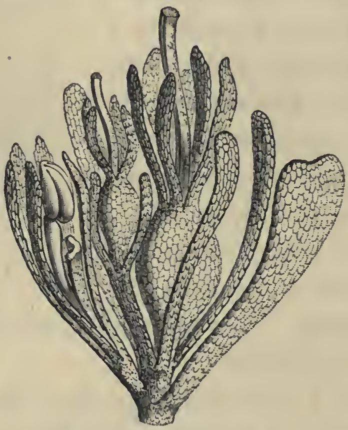

Fig. 487. Flowers ($\frac{15}{1}$).

In *Cynomorium*[3] (fig. 487, 488), of which only one,[4] Mediterranean,[5] species is known, the organization of the gynæcium is nearly the same as in *Balanophora*; but the female flower is more complete. It comprises a deep receptacle, the cavity of which lodges the unilocular, uniovulate cell, and its margin bears a perianth of from two to eight folioles[6] (sepals ?) coloured like the rest of the plant. The ovule is descending, very incompletely anatropous, with micropyle directed downwards and outwards.[7] The style is terminal, nearly cylindrical, canaliculate, at summit stigmatiferous obtuse or slightly enlarged. These flowers become hermaphrodite when to the parts just enumerated is added an epigynous stamen, similar to that of the male flower. The latter has, on a short receptacle, a variable number (1–8)[1] of claviform coloured sepals (?), and a posterior stamen,[2] with cylindrical filament and introrse, dorsifixed, versatile anther, having two cells each divided into two cellules and dehiscing by two longitudinal clefts.[3] The fruit is finally dry, indehiscent, monospermous, and the seed, adherent to the pericarp, contains under its coats an abundant oily albumen and an ovoid embryo, with pointed radicle, formed of a small number of cellules.[4] *C. coccineum* is a reddish fleshy fungiform [5] parasitic plant.[6] From its rounded and cylindrically ramified rhizome rise ascending aerial branches bearing alternate, imbricate scales,[7] and several are terminated by inflorescences in the form of thick oblong cylindrical catkins. The male flowers are sessile on their common receptacle, and the hermaphrodite or female flowers are inserted on small secondary branches; they are accompanied by coloured bracts.

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[1] HARV. and SOND. *Fl. Cap.* ii. 574.—WALP. *Ann.* iii. 511 (*Blepharochlamys*).

[2] Red or yellow.

[3] MICHELI, *Nov. Pl. Gen.* (1729) 17, t. 12.—L. *Gen.* n. 922; *Amœn.* iv. 351, t. 2.—ADANS. *Fam. des Pl.* ii. 80.—J. *Gen.* 445.—LAMK. *Dict.* ii. 241; Suppl. ii. 434 (part); *Ill.* t. 742.—L. C. RICH. *Mém. Mus.* viii. 420, t. 21.—ENDL. *Gen.* n. 717. —WEDD. *Ann. Sc. Nat.* sér. 3, xiii. 186, t. 11, fig. 43–47; *Bull. Soc. Bot. Fr.* iv. (1857) 513, 795; *Arch. Mus.* x. 269, t. 24–27.—HOOK. F. *Trans. Linn. Soc.* xxii. 29, 33, t. 1 A.—SCHNIZL. *Iconogr.* t. 39.—HOFMEIST. *N. Beitr.* i. 572, t. 2; *Pringsh. Jahrb.* i. 109, t. 10; *Ann. Sc. Nat.* sér. 4, xi. 37, t. 4, fig. 35–38.—EICHL. *Prodr.* 122.

[4] *C. coccineum* L. *Spec.* ed. 4, 89.—DESF. *Fl. Atl.* ii. 330.—BOISGEL. *Malt.* t. ii. (ex PRITZ.)—TRATT. *Thes.* t. 30.—GUSS. *Fl. Sic.* ii. 561.—BERTOL. *Fl. Ital.* x. 4.—MOR. *Fl. Sard.* iii. 445. —WEBB. *Fl. Canar.* iii. 431.—WILLK. et LGE. *Prodr. Fl. Hisp.* i. 223.—PARLAT. *Fl. Ital.* iv. 382.—*C. purpureum* RUPR. *Sert. Tiansch. Mem. Acad. Pétersb.* xiv. 72.—*C. purpureum officinarum* MICHELI, *loc. cit.* — *Kunomorion* DIOSC. (ex ADANS. *loc. cit.* 549).

[5] Found in Spain, Italy, Sicily, Sardinia, Greece, Malta, Morocco, Algeria, and other Mediterranean localities, in the Canaries, in Palestine, and Arabia, in Soungari and in the valley of Cashgar, etc.

[6] Often four or five.

[7] Furnished with a single coat.

Langsdorffia[8] ought not to be separated from the preceding types, if we admit the opinion of Hofmeister on the constitution of the gynæcium; for this author says that the unilocular ovary contains only a single descending ovule.[9] The male flowers have a perianth of two or three valvate folioles. The stamens are two or three in number, superposed to the folioles of the perianth, with monadelphous filaments, united in a cylindrical column, and extrorse anthers dorsally united, quadrilocellate and dehiscing by two longitudinal clefts, confluent above.[10] In the female flowers, the unique prismatic ovary is crowned by a projecting edge, representing a short epigynous perianth, and a simple style at summit stigmatiferous not enlarged. The fruit is drupaceous, with monospermous putamens, and the oily albumen envelopes an axile embryo, occupying about a third of its height. The only species of the genus, *L. hypogæa*,[1] is a parasite,[2] with tuberous rhizome and ramified aerial branches,[3] surrounded by a basilar volva covered with persistent imbricate scales, terminated by a unisexual or bisexual cluster or spike. The male flowers are pedicellate, sometimes intermixed with rudimentary gynæciums, and the female flowers are sessile and closely packed. It is a parasitic plant inhabiting all tropical continental America.

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[1] All are rarely wanting.

[2] Rarely two (Parlat).

[3] The pollen is subglobular, smooth, with three small warty prominences.

[4] Also containing oil.

[5] *Fungus melitensis* Auctt.—*F. mauritanicus verrucosus ruber* Petiv. *Gazoph.* t. 37, fig. 8.—*F. typhoides liburnensis* Till. *Cat. Hort. Pis.* 64, t. 25.—*F. typhoides coccineus melitensis* Bocc. *Ic. et Descr. Sic.* 81, t. 43.

[6] On the roots of very different plants (Myrtles, Pistachios, Lucernes, Salsola, Orach, Melilot Grasses, etc.).

[7] Variable in form according to the part of the plant which bears them (the peduncle of the inflorescence is destitute of them). Those immediately accompanying the flowers are claviform, truncate at the summit; to the partial inflorescences are often interposed obliquely peltate bracts, with oval head.

[8] Mart. *Eschw. Journ. Bras.* ii. 178; t. 5 (not Leandr.); *Nov. Gen. et Sp.* iii. 181, t. 298, fig. 1, t. 209.—Schott et Endl. *Melet.* 12.—Ung. *Ann. Wien. Mus.* ii. t. 4, 6.—Endl. *Gen.* n. 722.—Wedd. *Ann. Sc. Nat.* sér. 3, xiv. 187, t. 11, fig. 48–51.—Hook. f. *Trans. Linn. Soc.* xxii. 39, t. 9.—Hofmeist. *N. Beitr.* i. 576; *Ann. Sc. Nat.* sér. 4, xii. 40, t. 4, fig. 38–42.—Karst. *Nov. Actanat. Cur.* xxvi. p. ii. 903, t. 63, 64.—Eichl. *Act. Congr. Par.* (1867) 149, t. 2, fig. 28, 29; *Mart. Flor. Bras. Balanoph.* 9, t. 1–3; *Prodr.* xvii. 140.—*Senftenbergia* Kl. et Karst. (not Cord.).

[9] Eichler considers the placenta basilar and the ovule orthotropous, and intimately united with the wall of the ovarian cell. The placentation, in this case, would be the same as in the *Helosideæ*.

[10] The pollen is nearly globular, smooth, with 2, 3, or 4 pores.

Thönningia sanguinea[4] inhabits tropical western Africa; it has generally been placed in the same group as *Langsdorffia*, although the internal organization of its gynæcium is still unknown. Only the tube which represents an epigynous perianth in the female flowers is here much more elevated around the base of the style, and in the male flowers, which have from 3–6 stamens with filaments united in a fusiform cone,[5] the perianth is replaced by linear-subulate scales, from two to six in number. It is a red-coloured parasitic[6] plant, the flowers of which are in short spikes or diœcious capitules.

This family, as we have said, has had a larger extension than we here assign to it; a considerable number of other types have been comprised in it, particularly those designated under the name of *Lophophyteæ*, *Helosideæ*, and *Scybalieæ*, which have, principally in the organs of vegetation, a great number of characters in common[7] with the genera we have here retained among the *Balanophoraceæ*. But by their unilocular dicarpellar ovary and free central placenta, the genera we have separated approach much nearer the *Loranthaceæ*,[8] plants often parasitic and hence possessing characters of habit and colour similar to those presented by the *Balanophoraceæ*. The name was given to the latter in 1822 by L. C. RICHARD.[1] The genera previously known were left among those of uncertain place.[2] JUSSIEU does not mention *Sarcophyte*, established by SPARMANN in 1776.[3] In 1804 VAHL[4] made known *Thönningia*, the relation of which to *Langsdorffia* was plainly discerned as soon as the latter had been published by DE MARTIUS.[5] HARVEY discovered the genus *Mystropetalon* only in 1839,[6] and J. HOOKER described *Dactylanthus* in 1856.[7] By its gynæcium, the latter, as also *Cynomorium*, *Balanophora*, and especially *Langsdorffia* and *Mystropetalon* whose ovary is inferior, closely resemble *Hippuris*, and it is next to this that most botanists now agree with J. HOOKER,[8] WEDDELL, EICHLER,[9] etc. to range the unicarpellar *Balanophoraceæ*. They are moreover easily distinguished by their parasitic character, their colour, their male flowers, the simple organization of their ovule and seed, etc.

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[1] Mart. *loc. cit.*—*L. janeirensis* L. C. Rich.—*L. rubiginosa* Wedd. — *Thönningia mexicana* Liebm. *Forh. Skand. Natursf. Christ.* (1841) 17, 180.—*T. janeirensis* Liebm. *loc. cit.*—*Senftenbergia Moritziana* Kl. et Karst. ex *Linnæa*, xx. 460.

[2] On several Palms, Figs, etc.

[3] Yellow or reddish, rich in waxy matter.

[4] Vahl, *Dansk. Selsk. Skrivt.* vi. 124, t. 6.—Sch. et Thönn. *Beskr.* 431.—Hook. f. *Trans. Linn. Soc.* xxii. 42, t. 3.—Eichl. *Prodr.* 141.—*Conophyta purpurascens* Isert, *Reis.* 283.—*Hæmatostrobus* Endl. *Gen.* 76.

[5] Pollen globular 3-gonal, smooth with three verrucose prominences, scarcely visible.

[6] *Parasitus anonymus* Isert, *loc. cit.*

[7] It must be remembered, moreover, that these characters are found in a great number of parasitic plants not green, to whatever natural group they belong (*Orobrancheæ*, *Orchideæ*, *Monotropeæ*, *Lennaceæ*, etc.).

[8] Without being able actually to insist upon this point, we indicate the numerous analogies observed between the *Loranthaceæ* and *Balanophoreæ* on the one hand and the *Coniferæ* on the other. We know that the gynæcium of certain

Except *Balanophora*, of which a dozen species are enumerated, the genera of this small family are monotypes.[10] In reality therefore it comprises only seventeen or eighteen species, of which only one, *Cynomorium*, is European; another, *Langsdorffia*, from tropical America, and *Dactylanthus*, from New Zealand. In tropical and southern Africa are found the three genera *Sarcophyte*, *Thönningia*, and *Mystropetalon*; whilst all the *Balanophoras* known are from tropical or subtropical Asia and Oceania.

Balanophoreæ has even been considered as a naked ovule, and the Gymnosperm theory has consequently been extended to them. It is by the study of the female organ of the *Balanophoreæ* with central placenta, of their ovule and their embryogeny, that the same parts of the *Loranthaceæ* and *Coniferæ* will be more satisfactorily explained and vice versa; so that, as we have already said, if the latter are gymnosperms the former must necessarily also be considered as such, etc.

[1] *Mém. Mus.* viii. 404.

[2] J. *Gen.* (1789) 445.

[3] But it was not published till 1810.

[4] *Act. Holm.* xxvii.

[5] *Eschw. Journ. Bras.* ii. (1818).

[6] *Ann. Nat. Hist.* i.

[7] *Trans. Linn. Soc.* xxii.

[8] *Loc. cit.* 21.

[9] *DC. Prodr.* xvii. 119.

[10] There are perhaps two species of *Mystropetalon*.

The organs of vegetation have been the object of numerous researches.[1] These plants, of a white, yellow, red, or brown colour, are generally of a fleshy consistence, and their tissues are often filled with a waxlike substance,[2] starch,[3] or an astringent juice which gives them certain therapeutic properties.[4] They are perennial or more rarely monocarpous. The subterranean stem or rhizome is tuberous, simple or lobed, sometimes cylindrical or branched; it fixes itself directly to the roots of the foster plant, penetrates its substance, and attaches itself to its tissues in various ways,[5] without, however, uniting with them by true suckers (?). It is parenchymatous and traversed in different directions[6] by vascular bundles, forming a system sometimes very ramified and complicated. The surface of the rhizome, in *Balanophora*, bears papillæ consisting of simple or divided masses of cellular tissue, traversed by a passage; they are very numerous and in form of a cross in *B. dioica*, and are supposed to be intimately connected with the respiration of the plant.[7] The true stomata have not been observed; there are rarely hairs, which exist however in certain *Langsdorffia* and on the floriferous axes of *Thönningia*. WEDDELL describes the fibro-vascular bundles of the rhizome of *Cynomorium*[1] as "numerous, filiform, straight or slightly flexuose and irregularly distributed in the interior of the cellular tissue, so as closely to resemble the bundles of the same nature in a Monocotyledonous stem from which they are always distinguished by their parallelism." He has seen these bundles continued from the body of the rhizome to its ramifications. The bundle is formed of two different elements: elongate cellules analogous to young woody fibre and containing fecula; and, at the narrowest part of the bundle, rayed or scalelike vessels passing even to reticulate vessels. The parenchyma of a large number of *Balanophoraceæ* is permeated by hard or stony cellules or fibro-cellules, punctuate, and with walls traversed by numerous channels in the direction of their thickness; they abound especially in *Langsdorffia hypogæa*, certain *Balanophora*, etc. In *Langsdorffia*, EICHLER[2] has seen branches of a rhizome formed of a parenchyma consisting of elongate cellules in a vertical direction, and traversed lengthwise by twenty or thirty thin fibro-vascular bundles, disposed on a transverse circular or elliptical section, according as the organ is cylindrical or compressed, nearly equidistant from the centre and the surface, here and there anastomose, but corresponding to the general plan of organization of Dicotyledons. The vessels are loosely reticulate, rayed or punctuate, but not annular or spiral. Prosenchymatous cellules, containing protoplasm and voluminous cytoblasts, are interposed with the vessels. UNGER named this tissue *pseudoparenchyma*. The cellular tissue is elongate in a vertical direction and consists of smaller elements near the surface. Those quite superficial are often elongated in subulate hairs, formed of two cellules placed end to end. The soft cellules of the parenchyma are ordinarily punctuate.

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[1] TRATT. *Linnæa*, iii. 194.—UNGER, *Ann. Wien. Mus.* ii. 38.—GŒPP. *Nov. Acta Acad. Nat. Cur.* xviii. Suppl. i. 229; xxii. 117.—POLECK, *ibid.* xxii. 161.—GRIFF. *Trans. Linn. Soc.* xx. 96.—WEDD. *Mém. sur le Cynomorium* (see p. 503, note 3).—HOOK. F. *Trans. Linn. Soc.* xxii. 2, t. 3, 4, 6, 8.—CHAT. *Anat.* t. 93, 95, 99, 105 (part).—SOLMS, *Pringsh. Jahrb.* vi. 529.

[2] J. HOOKER indicated the wax cellules in *Balanophora* (*Trans. Linn. Soc.* xxii. t. 4), and EICHLER (*Mart. Fl. Bras. Balanoph.* t. 2) in *Langsdorffia*. This substance exists also in *Thönningia*. It has been called *balanophorium* and *balanophorine*. It renders *L. hypogæa* so combustible that tapers are made of it at Bogota, and torches in many parts of Columbia.

[3] In *Cynomorium, Sarcophyte, Mystropetalon.*

[4] *Cynomorium coccineum* yields by pressure a reddish, bitter, and styptic juice described by BOCCONE as astringent in cases of sores, contusions, hæmorrhage, dysentery, etc. The Knights of Malta are said to have prepared from it a powerful remedy for wounds received in battle. A dental opiate has been prepared from it, and an astringent decoction said to be successfully prescribed for certain ulcers.

[5] J. HOOKER has classed the *Balanophoreæ*, according to the mode of insertion on the foster plant, in three groups: those in which the vascular fascicles of the foster root terminate definitely in the tissue of the parasite at some distance from the point of insertion; the vascular systems of the two plants being in no part in immediate affinity; those in which the connexion between parasite and nurse is solely by the intervention of a cellular tissue; those in which the fascicles of the foster root are continued with those of the rhizome. WEDDELL has pointed out that the two latter modes of insertion are united in *Cynomorium*. He describes, in the latter, radical suckers and tubercular suckers. The former have only a central vascular fascicle; the latter correspond to grafts on the largest roots. "Nothing more variable than the disposition of the tissues in these grafts."

[6] The disposition of these fascicles becomes more regular in the cylindrical rhizomes.

[7] JUNGHUHN says (*Nov. Acta* xviii. Suppl. 223), and the observation has been constantly repeated, that *B. glabra* does not bear these papillæ except in cases where it springs from the same root as *B. elongata*.

J. HOOKER[3] resumed and verified the principal points of the internal structure of *Balanophora*.[4] He thinks that in many species of this genus the rhizome continues to grow for many years, and after having put forth numerous floriferous branches in a single season, dies the following autumn, whilst in *B. involucrata*, for example, the rhizome may live a long time and flower every year. It requires several weeks for an aerial branch to emerge from the rhizome and bear flowers. *Balanophora* is a good example of a type in which the vascular tissue of the parasite is continuous with that of the root, and J. Hooker has seen, in macerated plants of *B. dioica*, the vascular bundles, condensed at the time of vegetation, group themselves in continuous masses from the base of the divisions of the plant in the rhizome to the inflorescence. The root of the plant on which *B. fungosa* grows being destitute of medulla, he has seen the branches which it appears to send into the parasites furnished with a medulla, and the wood of these branches terminate abruptly at some distance from the base of the rhizome. The branches, terminated in cylindrical masses of cellular tissue, contained a small number of rayed or imperfectly spiral vessels. J. Hooker rejects the opinion of Gœppert and Unger, who consider the rhizome of *Balanophora* as a body intermediate between the foster plant and the parasite. In *B. involucrata* in germination, he observed in the axis of the rhizome faint and transparent lines, formed of elongate cellules, without wax or stone, surrounding the rudiments of vascular bundles; and, without seeing examples, he presumes that these bundles descend thence to the vascular system of the root.

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[1] *Arch. Mus.* x. 277, t. 26.

[2] EICHL. *Mart. Fl. Bras. Balanoph.* t. 2, fig. 3, 5, 6, 11.—HOOK. F. *Trans. Linn. Soc.* xxii. t. 2.

[3] HOOK. F. *loc. cit.* 13, t. 2, fig. 4.

[4] See also, on this question, the memoir of GŒPPERT, cited above, principally plate II. fig. 28** and 30*.

The rhizome is most frequently destitute of appendages; sometimes, however, it bears scales. The appendages of the aerial branches[1] are of various kinds. At the base is a sort of case or volva which has been compared, erroneously, to that of the higher fungals. Higher up, the scales, which occupy the place of leaves, are alternate, opposite, free or more rarely connate.[2] They are often wanting on a considerable portion or the whole length of the branch below the inflorescence. At its level, on the other hand, the scales ordinarily reappear, often enveloping the entire inflorescence in early age, then changing their character and becoming narrow or claviform under the flowers, sometimes peltate at the level of the secondary floral groups, as in *Cynomorium*. Bracts and bracteoles are often absent under the female flowers.

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[1] These often emerge from the rhizome as an adventitious bud.

[2] In *Balanophora involucrata* Hook f. (*Trans. Linn. Soc.* xxii. 30, t. 4–7).

GENERA.

1. **Balanopora** Forst.—Flowers monœcious or diœcious. Male flower: perianth 3–6-phyllous (coloured), rarely 2-phyllous, valvate. Stamens equal in number to folioles of perianth or more (up to 60; in crowded sub-6-gonal cellules, singly 1-rimose), connate in a capitule; filaments connate in central column; anthers 1–2-locular, subrotund and transversely rimose or hippocrepiform, sometimes linear erect, longitudinally rimose or 6-gonal and rimose. Female flowers naked; germen ovoid, attenuate in slender style, 1-locular. Ovule 1, inserted under apex of cell or short (1-cellular) funicle, descending, anatropous pauci-cellulose; integument 0. Fruit nucamentaceous; exocarp thin subcrustaceous; putamen hard, 1-spermous. Seed completely filling cavity of putamen, descending; albumen copious grandicellulose, oily; embryo superior very small subrotund pauci-cellulose.—Fleshy fungiform parasitic plants (coloured); rhizome tuberous or elongate stellately lenticellate, simple or lobed or branched; floral branches breaking from rhizome aerial, at base sheathed in volva, clothed with imbricate alternate or rarely opposite, free or connate scales or naked above; flowers in a terminal spike or globose or elongate more rarely clavate capitule; inflorescence 1–2-sexual; male flowers in 2-sexual inferior, rather larger pedicellate; female very small, in 2-sexual inflorescence superior, shortly racemose or spicate in secondary axes, sometimes subverticillate "and growing together in a subhomogeneous velvety or minutely granular layer," ebracteate; secondary axes small, not floriferous at apex and dilated to a clavate (spadicellate) body. (*Warm Asia and Oceania.*) —See p. 503.

2? **Dactylanthus** Hook. f.—Flowers diœcious naked; males consisting of 1, 2 stamens; filaments very short; anthers subovoid, 2-rimose. Female flowers consisting of bare gynæcium (of *Balanophora*); internal structure and fruit not known.—A fleshy parasitic plant, in appearance like *Balanophora*; rhizome (starch bearing?) tuberous, irregularly lobed; aerial floral branches 1-sexual; volva short basilar; scales imbricate, ovate or oblong, persistent; inflorescence terminal consisting of amentiform ebracteate spadicules disposed in a subrotund corymb (?); flowers (very small) ebracteate. (*New Zealand.*)—See p. 505.

3. **Sarcophyte** Sparm. — Flowers diœcious. Male flower: perianth 3–4-lobed; lobes concave within, valvate or subinduplicate. Stamens 3, 4, opposite folioles of perianth and adnate with them at base; filaments cylindrical erect; anthers terminal capitate multilocellate; cellules irregularly poricidal. Female flower naked. Germen short sessile, crowned with short discoid papillose style, 1-locular, 1–3-ovulate; ovules descending anatropous subovoid, reduced to an amniotic sac (?); funicle short, 1-cellular. Fruit scantily drupaceous (similar to germen and a little larger); putamen obtusely 3-gonal. Seed 1, descending, completely filling cavity of pericarp; albumen large-celled, oily; embryo subcentral globose small-celled oily. — Fleshy (coloured) plants; rhizome tuberous generally lobed, esquamate; aerial floriferous branches sheathed at base with short volva; scales persistent; flowers in a terminal bracteate ramose raceme (?); secondary branches ebracteate bearing solitary male flowers or capitate female flowers connate at base. (*South. Australia.*)—See p. 505.

4. **Mystropetalon** Harv.—Flowers monœcious. Male flower: perianth 3-phyllous; folioles unguiculate cochlear-subspathulate unequal, connate at base, valvate; 2 posterior more highly connate; anterior a little shorter narrower. Stamens 3, opposite folioles of perianth; anterior sterile smaller or scarcely perceptible; 2 posterior fertile; filaments slender adnate to perianth at base; anthers ovoid extrorse, versatile; cells 2, 2-locellate, longitudinally rimose. Gynæcium rudimentary sterile. Female flower: receptacle ovoid concave, enclosing adnate germen and bearing perianth inserted on margin above; folioles 3, connate at base in pitcher or tube, free

above. Stamens 3 sterile, opposite folioles, minute, or 2, opposite posterior folioles; the third very small or 0. Germen inferior 1-locular; style slender cylindrical elongate, at apex capitate stigmatose, subentire or slightly 3-lobed. Ovules 1–3, descending, inserted on short 1-cellular funicle, anatropous, reduced to an amniotic (?) sac. Fruit scantily drupaceous; putamen thin. Seed 1, descending; albumen fleshy oily large-celled; embryo superior ovoid small-celled oily.—Fleshy (coloured) parasitic plants, starch-bearing; rhizome . . . ?; aerial floral branches scaly; flowers in a terminal 2-sexual spike; males above; females below more numerous, 1-bracteate; lateral bracteoles 2; female portion of inflorescence much longer than male. (*South Africa.*)—See p. 505.

5. **Cynomorium** Micheli.—Flowers polygamous. Receptacle of male flower short; folioles of perianth (?) 1–8, oftener unequally distant bracteiform linear-clavate (coloured). Stamen 1, [or rarely (?) 2]; filament slender erect subulate; anther introrse, versatile; cells 2, introrse, 2-locellate, longitudinally rimose. Germen rudimentary oblong clavate canaliculate, obtuse at apex. Receptacle of female flower ovoid very concave, enclosing adnate germen, bearing at or under the margin of the perianth bracteiform folioles similar to those of the male flower (sometimes more rarely 0). Germen inferior, 1-locular; style simple stigmatose. Ovule 1, ∞-cellular, inserted under apex of cell, descending, incompletely anatropous; micropyle downwards; coat simple. Hermaphrodite flower similar to female; stamen 1 (as in male flower) epigynous, interior to perianth. Fruit nutlike; pericarp thin subcoriaceous. Seed 1, descending, filling cell; testa rather thick; subcorneous oily; radicle of ovoid embryo acute facing micropyle; cellules small oily.—(Red) fleshy parasitic plants; rhizome tuberous ramose, clothed with root-like processes of various form; aerial floral branches scaly, partly naked; flowers in cylindrical or oblong ovoid terminal spike; males sessile on common receptacle; hermaphrodite and female small few in secondary axes, racemosely cymose (?), bracteate. (*Mediterranean regions, European, African, and Asiatic, the East, Soungaria, Canary Isles.*)—See p. 506.

6? **Langsdorffia** Mart.—Flowers monœcious. Male flower: perianth 2–3-merous (coloured); folioles ovate marginate concave, valvate; 2 anterior, the third posterior. Stamens equal in number and opposite folioles; filaments connate in cylindrical column; anthers dorsally coherent, extrorse, 2-locular, 4-locellate; clefts 2 longitudinal, confluent at apex. Receptacle of female flower hollow linear-prismatic tubular enclosing adnate germen, above produced to irregular epigynous margin (perianth ?). Style 1, terminal cylindrical simple, stigmatose from middle. Ovule in cell 1, descending (?); micropyle extrorsely superior. Fruit at apex umbilicate with scar of style, sparsely drupaceous; putamen rather hard. Seed filling putamen; albumen copious large-celled oily; embryo subglobose axile, situate higher than centre, small-celled.—Fleshy (coloured) parasitic plants, more or less pilose; rhizome tuberous lobate; branches sometimes long cylindrical, creeping or ascending; aerial floral branches, girt at base with lobed volva, higher clothed with acute imbricate scales; flowers in spikes or 1-sexual terminal ovoid or subglobose capitules; males free ebracteate pedicellate (sometimes intermixed with abortive gynæcia); females sessile ebracteate, united together above or in their whole length. (*Both trop. Americas.*)—See p. 507.

7. ? **Thönningia** Vahl.—Flowers diœcious (nearly of *Langsdorffia*). Male flower: perianth (?) consisting of 2–6 separate linear-subulate squamules. Stamens 3–6, 1-adelphous; column thick conical fusiform; anthers extrorse, 2-locular, 4-locellate, 2-rimose; valves thin. Female flowers (externally of *Langsdorffia*); perianth (?) epigynous longer tubular; internal structure (as of fruit) unknown.—Fleshy (red) parasitic plants; rhizome ("from tuberous centre ?") ramose; branches creeping cylindrical tomentose; floral branches aerial springing laterally from branches or lobes ("adventitious"); volva, scales, terminal inflorescence, etc. (where known) of *Langsdorffia*. (*Trop. west. Africa.*)—See p. 508.

INDEX OF GENERA AND SUB-GENERA

CONTAINED IN THIS VOLUME.

Abbevillea, Berg, 355
Abelicea, Bell, 142, 188
Acanthinophyllum, Allem., 154, 203
Acanthochlamys, Spach, 227
Acca, Berg, 356
Achymus, Soland., 198
Acicalyptus, A. Gray, 313, 358
Acmena, DC., 357
Acrandra, Berg, 356
Acrossanthus, Presl, 382
Actegeton, Bl., 11
Actinodium, Schau, 324, 370
Adamaram, Rheed, 284
Adambea, Lamk, 455
Adenaria, H. B. K., 433, 451
Adenosepalum, Spach, 386
Adenotrias, Spach, 386
Adolphia, Meissn., 63, 92
Aetia, Adans, 263
Agallochum, Rumph., 102
Agassizia, Spach, 464
Agasta, Miers, 374
Agathisanthes, Bl., 271
Agonis, DC., 316, 360
Alangium, Lamk, 271, 286
Alaternus, T., 53
Alcanna, Gærtn., 456
Alicastrum, P. Br., 211
Allæanthus, Thw., 148, 196
Allanblackia, Oliv., 401, 423
Allantoma, Miers, 379
Alnaster, Endl., 224
Alnaster, Spach, 224
Alnus, T., 223, 257
Alphitonia, Reiss., 56, 79
Alzatea, R. & Pav., 4, 32
Amanella, Miq., 442
Ameletia, DC., 442
Ammania, Houst., 440, 459
Amomis, Berg, 353
Ampalis, Boj., 146, 193
Ampelocera, Kl., 144, 192
Anaclissa, Endl., 101
Anamomis, Griseb., 309
Ancistrolobus, Spach, 385
Androgyne, A. DC., 233
Androsæmum, All., 387
Androstylium, Miq., 395
Aneuriscus, Presl., 402
Angolam, Adans., 271
Angolamia, Scop., 271
Angophora, Cav., 321, 368
Anisophyllea, R. Br., 295, 307
Anisophyllum, Don., 296
Anisotes, Lindl., 431
Anogeissus, Wall., 268, 283
Anogra, Spach, 463
Anstrutheria, Gardn., 307
Antherylium, Vahl., 434, 454
Anthodiscus, Mart., 47
Anthodon, R. & Pav., 47
Antiaris, Lesch., 157, 206
Aphananthe, Pl., 143, 191
Aphanomyrtus, Miq., 336
Apoterium, Bl., 410
Aquilaria, Lamk., 102, 123
Argyrodendron, Kl., 263
Arillastrum, Panch., 320, 366
Arjuna, Jones, 455
Arongana, Pers., 384
Arrudea, A. S.-H., 392
Arthrosolen, C. A. Mey, 112, 136
Artocarpus, L., 151, 202
Ascyrum, L., 358
Aspidandra, Hassk., 167
Aspidocarpus, Neck., 83
Astartea, DC., 317, 361
Asteranthos, Desf., 333, 380
Asterocarpus, Eckl. & Zeyh., 38
Asterogyne, Wall., 40
Asteromyrtus, Schau., 362
Astræa, Schau., 373
Astrotheca, Miers, 395
Ataxandria, Benth., 360
Aubletia, Gærtn., 376
Aubletia, Lour., 83
Aulacocarpus, Berg., 313, 359
Aulomyrcia, Berg, 353
Avellana, Bauh., 227
Azima, Lamk., 11, 44

Babingtonia, Lindl., 361
Backhousia, Hook. & Harv., 321, 368
Badamia, Gærtn., 268, 283
Bæckea, L., 316, 361
Bagassa, Aubl., 155, 204
Balanophora, Forst., 503, 513
Balanops, H. Bn., 240, 261
Balaustion, Hook., 317, 361
Balboa, Pl. & Tri., 399
Ballardia, Montrouz., 366
Balsamaria, Lour., 410
Balsamona, Vandell., 453
Banava, Camell., 455
Banksia, Domb., 453
Banksia, Forst., 138
Baraultia, Steud., 291
Barraldeia, Dup.-Th., 291, 303
Barringtonia, Forst., 326, 374
Batis, Roxb., 198
Baumannia, Spach, 463
Beaufortia, R. Br., 318, 363
Beauharnoisia, R. & Pav., 401
Bejuco, Loefl., 13
Belionkandas, Celt., 480
Belvala, Adans., 137
Belvisia, Desvx., 331
Berchemia, Neck., 56, 80
Bertholletia, H. B., 331, 379
Bertolonia, Spreng., 401
Betula, T., 220, 257
Betulaster, Reg., 222
Betulaster, Spach, 222
Bhesa, Ham., 39
Billiottia, R. Br., 360
Billottia, Colla, 363
Blackstonia, Scop., 402
Bleekrodea, Bl., 151, 201
Blennoderma, Spach, 464
Blepharistemma, Wall., 295, 306
Blepharocalyx, Berg., 309
Blepharochlamys, Presl., 505
Boaria, Griseb., 37
Boisduvalia, Spach, 464
Boscia, Velloz., 131
Bosqueia, Dup.-Th., 160, 210
Bosscheria, Vr. & Teysm., 212
Botryoropis, Presl., 326
Brachysiphon, A. Juss., 101
Brathydium, Spach, 386
Brathys, Mut., 388
Brebissonia, Spach, 470
Brindonia, Dup.-Th., 406
Britoa, Berg., 355
Brocchia, Maur., 49

Brosimum, Sw., 209
Broussonetia, Vent., 146, 195
Bruguiera, Lamk., 290, 303
Bucephalon, Plum., 195
Buceras, P. Br., 283
Buchenavia, Eichl., 268, 283
Bucida, L., 268, 283
Burchardia, Neck., 356
Bureava, H. Bn., 263
Butonica, J., 326
Buxus, T., 16, 48

Cacoucia, Aubl., 263
Cæsia, Velloz., 79
Cahotia, Karst., 395
Cajuputi, Adans., 362
Calaba, Plum., 410
Calius, Blanco, 167
Callæocarpus, Miq., 237
Callistemon, R. Br., 362
Calophylica, Presl., 87
Calophyllum, L., 410, 428
Calopyxis, Tul., 263
Calothamnus,Labill.,318,363
Calucechinus, Hombr., 237
Calusparassus, Hombr., 237
Calycampe, Berg., 353
Calycolpus, Berg., 310
Calycopteris, Lamk., 267, 283
Calycorectes, Berg., 313, 359
Calycothrix, Meissn., 372
Calylophis, Spach, 463
Calylophus, Spach, 463
Calymmatanthus, Schau.,371
Calyplectus, R. & Pav., 457
Calypso, Dup.-Th., 47
Calyptranthes, Sw., 311, 355
Calyptranthus, J., 355
Calyptromyrcia, Berg., 353
Calyptropsidium, Berg., 356
Calysaccion, Wight, 426
Calysericos, Eckl. & Zeyh., 127
Calythrix, Labill., 325, 372
Cambea, Ham, 375
Cambogia, L., 406
Camphoromyrtus, Schau., 361
Campomanesia, R. & Pav., 311, 355
Camptotheca, Dcne., 271, 285
Campylopus, Spach, 386
Campylosporus, Spach, 386
Campylostemon, Welw., 16, 47
Canalia, Schm., 127
Cannabis. T., 162, 218
Canotia, Torr., 7, 42
Caprificus, Gasp., 212
Capura, L., 134
Carallia, Roxb., 291
Cardiogyne, Bur., 148, 197
Cardiolepis, Rafin, 53
Careya, Roxb., 328, 375
Carica, Miq., 212
Cariniana, Casar, 328, 377
Carpinites, Ung., 250
Carpinus, T., 227, 258
Caryophyllus, T., 313, 357
Caryospermum, Bl., 39
Cassine, L., 4, 34
Cassine, Mill, 4, 33
Cassipourea, Aubl., 294, 306
Castanea, T., 233, 260
Castaneopsis, Bl., 233
Castanopsis, Don, 237
Castilloa, Cervant, 157, 207
Catalissa, Miers, 413
Catalium, Ham, 291
Catappa, Gærtn., 268, 284
Catha, Endl., 36
Catha, Forsk., 3, 31
Cathastrum, Turcz, 5, 36
Catinga, Aubl., 357
Caturus, Lour., 148, 196
Ceanothus, L., 57, 81
Cecropia, Loefl., 162, 216
Celastrus, L., 5, 36
Celtis, T., 142, 189
Cenchramidea, Presl., 396
Cephalotrophis, Bl., 196
Ceratostachys, Bl., 271
Cercodea, J., 477
Cercodia, Murr., 477
Cercophora, Miers, 378
Ceriops, Arn., 290, 302
Cerocarpus, Hassk., 358
Cerquieria, Berg., 353
Cerroides, Spach, 233
Cervispina, Mœnch., 69
Chætacme, Pl., 192
Chamæjasme, Amm., 135
Chamælaucium, Desf., 322, 369
Chamænerium, Tausch., 467
Chamissonia, Link, 464
Cheynia, Drumm., 361
Chicarronia, A. Rich., 284
Chiratia, Montrous, 376
Chlamydanthus, C. A. Mey., 135
Chlamydobalanus, Endl., 233
Chloromyron, Pers., 426
Chlorophora, Gaudich., 196
Chrysochlamys, Pœpp., 401, 423
Chrysoliga, W., 450
Chrysorrhoe, Lindl., 371
Chrysostachys, Pohl, 263
Chuncoa, Pav., 268, 284
Chydenanthus, Miers, 374
Chylisma, Nutt, 464
Chymococca, Meissn.,113,137
Chytraculia, P. Br., 355
Chytralia, Adans., 355
Chytroma, Miers, 379
Cienkowskia, Reg.&Rach.,21
Circæa, L., 473, 498
Clarisia, R. & Pav., 218
Clarkia, Pursh., 466, 494
Clavimyrtus, Bl., 313, 357
Cleistocalyx, Bl., 358
Clercia, Velloz., 47
Clethropsis, Spach, 224
Cloezia, Br. & Gr., 366
Clusia, L., 395, 421
Clusianthemum, Vieill., 406
Clusiastrum, Pl. & Tri., 396
Clusiella, Pl. & Tri., 400, 422
Cneoroides, Spach, 134
Coapia, Pis., 382
Coccifera, Spach, 233
Cochlanthera, Chois., 395
Coleophora, Miers, 129
Colletia, Commers., 62, 91
Colubrina, Rich., 55, 78
Comarostigma,Pl.& Tri., 407
Combretocarpus, Hook. f. 297
Combretum, L., 263, 280
Commersona, Sonner, 326
Commersonia, Commers., 38
Commirhea, Miers, 401
Comptonia, Banks, 245
Condalia, Cav., 58, 84
Conocarpus, Gærtn., 268, 284
Conocephalus, Bl., 161, 215
Conophyta, Isert, 508
Conothamnus, Lindl., 362
Cookia, Gmel., 138
Cordylandra, Pl. & Tri., 396
Coridium, Spach, 386
Cormonema, Reiss., 56, 79
Cornelia, Arduin, 440
Corylus, T., 225, 258
Corynostigma, Presl., 466
Coupoui, Aubl., 335
Couratari, Aubl., 329, 378
Couroupita, Aubl., 329, 378
Coussapoa, Aubl., 162, 215
Covellia, Gasp., 212
Crantzia, Sw., 16
Cratericarpium, Spach, 464
Cratoxylon, Bl., 365, 393
Crematostemon, Hort., 424, 448
Crenea, Aubl., 451
Criuva, Pl. & Tri., 395
Cruviopsis, Pl. & Tri., 396
Crocoxylon,Eckl. & Zeyh.,33
Crossopetalum, P. Br., 34
Crossophyllum, Spach, 386
Crossostigma, Spach, 468
Crossostylis, Forst., 293, 304
Crumenaria, Mart., 60, 86
Cryptadenia, Meissn., 128
Cryptandra, Sm., 62, 90
Crypteronia, Bl., 438, 458
Cryptostemon, F.Muell.,370
Cryptotheca, Bl., 442
Cubospermum, Lour., 466
Cudrania, Tréc., 155, 205
Cudranus, Rumph., 205
Cuervea, Tri., 13

Cuphea, P. Br., 433, 453
Cuphæanthus, Seem., 313, 357
Cyathodiscus, Hochst., 132
Cyclobalanus, Endl., 233
Cynomorium, Micheli, 506, 515
Cynopsole, Endl., 503
Cynoxylon, Plum., 269
Cystogyne, Gasp., 212

Dactylanthus, Hook. f., 505, 514
Dactylopetalum, Benth., 295, 306
Dais, L., 109, 129
Dantia, Pet., 466
Daphnanthes, C. A. Mey., 134
Daphne, L., 111, 133
Daphnikon, Pohl, 13
Daphnobryon, Meissn., 137
Daphnopsis, Mart. & Zucc., 130
Darwynia, Rudg., 323, 369
Davidia, H. Bn., 271, 285
Decalophium, Turcz., 322
Decaspermum, Forst., 310, 353
Decodon, Gmel., 450
Demidofia, Dennst., 291
Denhamia, Meissn., 5, 36
Denhamia, F. Muell., 5
Dessenia, Adans., 127
Diarthron, Turcz., 112, 136
Diatoma, Lour., 291
Dicranolepis, Pl., 107, 127
Dicranostachys, Tréc., 162, 217
Didiplis, Rafin, 440
Didymeles, Dup.-Th., 244, 262
Didymophora, Miq., 212
Diplachne, R. Br., 371
Diplalangium, H. Bn., 273
Diplandra, Hook. & Arn., 474, 498
Diplesthes, Harv., 47
Diplocos, Bur., 149, 199
Diplodon, Spreng., 458
Diplomorpha, Meissn., 134
Diplusodon, Pohl, 437, 458
Dirca, L., 110, 132
Discaria, Hook., 63, 91
Discostigma, Hassk., 407
Disomene, Banks & Sol., 483
Distegocarpus, S. & Zucc., 228
Ditheca, Wight & Arn., 440
Dobera, J., 12, 45
Dodecas, L., 432, 451
Dofia, Adans., 132
Dorstenia, Plum., 149, 199
Dorvalia, Commers., 476
Doxoma, Miers, 375
Draparnaudia, Montroux, 365
Drapetes, Lamk., 113, 138
Drosanthe, Spach, 386
Drosocarpium, Spach, 386
Drymispermum, Reinw., 104
Dryoptelea, Spach, 142
Dryptopetalum, Arn., 304
Duabanga, Ham. 435, 455
Dubyæa, DC., 458
Dumartroya, Gaudich., 196
Duvernaya, Desp., 453

Edgeworthia, Meissn., 111, 133
Elæodendron, Jacq. f., 4, 33
Eliæa, Cambess., 385, 393
Ellobium, Lilj., 470
Elodea, Spach, 386
Elodes, Spach, 386
Elscholtzia, Rich., 378
Embryogonia, Bl., 263
Emmenosperma, F. Muell., 54, 76
Encleisocarpon, Miq., 233
Encliandra, Zucc., 470
Endodesmia, Benth., 393
Endonema, A. Juss., 98, 101
Enkleya, Griff., 130
Entelia, R. Br., 442
Enydria, Velloz., 480
Epicarpurus, Bl., 198
Epichroxantha, Eckl. & Zeyh., 127
Epilithes, Bl., 481
Epilobium, L., 467, 495
Eremæa, Lindl., 318, 364
Eremanthe, Spach, 386
Eremopyxis, H. Bn., 373
Eremosporus, Spach, 388
Ericomyrtus, Turcz., 361
Eriosolena, Bl., 133
Eriosycea, Miq., 212
Erosma, Both., 212
Erythrobalanus, Spach, 233
Erythrogyne, Vis., 212
Eschweilera, Mart., 379
Esculus, Gay. 233
Eubeaufortia, H. Bn., 363
Eubetula, Reg., 223
Eucalyptus, Lhér., 320, 367
Eusastanea, H. Bn., 237
Eucastanopsis, A. DC., 237
Eucelastrus, H. Bn., 37
Euceltis, H. Bn., 190
Eucentrus, Presl., 36
Eucharidium, Fisch. & Mey., 467
Euclissa, Endl., 101
Euclusia, Pl. & Tri., 396
Eucuphea, Kœhne, 454
Eudesmia, R. Br., 367
Euendonema, H. Bn., 101
Eufagus, A. DC., 239
Eufuchsia, H. Bn., 470
Eugenia, Micheli, 312, 357
Eugeniastrum, Griseb., 358
Eugeniopsis, Berg., 311, 355
Eulinostoma, Meissn., 105
Eulobus, Nutt., 464
Eumelaleuca, H. Bn., 362
Eumyrtus, H. Bn., 310
Eunesæa, B. H., 450
Euœnothera, Torr. & Gr., 464
Euosanthes, Cunn., 370
Eupellacalyx, H. Bn., 305
Euquapoya, H. Bn., 400
Euryomyrtus, Schau., 361
Eusalacia, H. Bn., 47
Eusarcocolla, Endl., 100
Euonymus, T., 1, 30
Eutristania, B. H., 364
Euverticordia, Schau, 371

Fabricia, Gærtn., 314
Fagites, Ung., 250
Fagus, T., 237, 260
Fatioa, DC., 455
Fatoua, Gaudich., 150, 200
Fatræa, J., 283
Faya, Webb, 246
Fegonium, Ung., 250
Feijoa, Berg., 311, 354
Feliciana, Cambess., 356
Fenzlia, Endl., 311, 354
Ferolia, Aubl., 211
Ficus, T., 160, 211
Fleuria, Miq., 201
Florinda, Noronh., 38
Fœtidia, Commers., 328, 375
Forrestia, Rafin., 81
Forsgardia, Velloz., 263
Francisia, Endl., 370
Frangula, T., 53
Frauenhofera, Mart., 6, 40
Fremya, Br. & Gr., 365
Friedlandia, Cham., 458
Fropiera, Hook. f., 439
Fuchsia, Plum., 469, 496
Funifera, Leandr., 131
Funkia, Dennst., 281

Galactodendron, H. B. K., 211
Gale, Bauh., 245
Gallifera, Spach, 233
Galoglychia, Gasp., 212
Galumpita, Bl., 191
Garcinia, L., 405, 425
Gaslondia, Vieill., 357
Gaura, L., 471, 496
Gauridium, Spach, 472
Gauropsis, Presl., 466
Gayophytum, A. Juss., 465, 493
Geissoloma, Lindl., 19, 51
Gelpkea, Bl., 358
Genetyllis, DC., 370
Genoria, Pers., 451

Getonia, Roxb., 283
Gimbernatia, R. & Pav., 284
Ginora, L., 432, 451
Ginoria, Jacq., 451
Ginoria, Sess. & Moç., 450
Gironniera, Gaudich., 143, 190
Glaphyria, Jack, 314
Glischrocaryon, Endl., 479
Glossopetalon, A. Gray, 7, 42
Glossopetalum, Schreb., 10
Glyptopetalum, Thw., 3
Glyschrocolla, A. DC., 101
Gnidia, L., 108, 127
Gnidium, Spach, 134
Godetia, Spach, 464
Gomidezia, Berg., 353
Gomphanthera, Pl. & Tri., 396
Gonatocarpus, W., 477
Gongylocarpus, Cham., 472, 497
Goniocarpus, DC., 477
Gonistylus, Teysm. & Binn, 105, 124
Gonjocarpus, Kœn., 477
Gonocarpus, Ham, 263
Gonocarpus, Thunb., 477
Gonophyllum, Eckl. & Zeyh., 128
Goodallia, Benth., 130
Gouania, L., 59, 85
Goupia, Aubl., 10, 44
Greggia, Gærtn., 357
Grias, L., 376
Grislea, Lœfl., 433, 452
Gruropsis, Presl., 466
Guaiava, T., 356
Guapurium, J., 357
Guiera, Adans., 267, 282
Guiina, Crueg., 411
Gunnera, L., 482, 501
Gunneropsis, Œrst., 483
Gupia, J. S.-H., 10
Gustavia, L., 328, 377
Gymnagathis, Schau., 362
Gymnococca, Fisch. & Mey., 138
Gymnosporia, Wight & Arn., 5, 36
Gymnothyrsus, Spach, 224
Gynotroches, Bl., 293, 304
Gyrinops, Gærtn., 104, 123
Gyrinopsis, Dcne., 103
Gyrolecana, Bl., 233

Hæmatostrobus, Endl., 508
Hænkea, R. & Pav., 37
Haloragis, R. Br., 479
Haloragis, Forst., 477, 500
Hambergera, Scop., 263
Hambergeria, Neck., 263
Hapalocarpum, W. & Arn., 442
Haplopetalum, A. Gray, 304
Hargasseria, A. Rich., 130
Hargasseria, Schied. & Depp., 130
Harmogia, Schau., 361
Haronga, Dup.-Th., 384, 392
Harongana, Lamk., 384
Hartmannia, Spach, 464
Hartogia, Thunb., 4, 34
Harveya, Plant., 132
Hauya, Moç. & Sess., 469, 495
Havetia, H. B. K., 400, 422
Havetiella, Pl. & Tri., 399
Havetiopsis, Pl. & Tri., 398
Hebradendron, Grah., 407
Hedaroma, Lindl., 370
Hedraianthera, F. Muell., 37
Heimia, Link & Ott., 450
Helianthostylis, H. Bn., 155, 205
Helicostylis, Tréc., 208
Helinus, E. Mey., 60, 86
Helminthosperma, Thw., 190
Hemiptelea, Pl., 142, 188
Hemiquapoya, Pl. & Tri., 400
Henslowia, Wall., 438
Heterogaura, Rothr., 472, 497
Heterolæna, Fisch. & Mey., 138
Heteropyxis, Harv., 444
Heterostemum, Nutt., 464
Hexachlamys, Berg., 357
Hippocratea, L., 13, 46
Hippuris, L., 484, 502
Holoptelea, Pl., 142, 187
Holosepalum, Spach, 386
Holostigma, Spach, 464
Homalocalyx, F. Muell., 326, 373
Homalospermum, Schau., 314
Homoioceltis, Bl., 191
Homoranthus, Cunn., 324, 370
Horau, Adans., 281
Hornschuchia, Bl., 385
Hovenia, Thunb., 55, 77
Humulus, T., 165, 219
Huttum, Adans., 326
Hydrolythrum, Hook. f., 443
Hylas, Bigel, 480
Hypericum, Spach, 387
Hypericum, T., 386, 394
Hypobrichia, Curt., 441
Hypocalymna, Endl., 317, 361

Ichthyosma, Schlchtl, 505
Ilex, Gay, 233
Ilex, T., 230
Imbricaria, Sm., 361
Inophyllnm, Burm., 410
Iridaps, Commers., 174
Isnardia, L., 465
Isophyllum, Spach, 386

Jambosa, DC., 357
Jambosia, Rumph., 313, 358
Jehlia, Hort., 474
Johnia, Roxb., 47
Jossinia, Commers., 357
Jugastrum, Miers, 379
Jungia, Gærtn., 361
Jussiæa, L., 466

Kalengi, Rheed., 164
Kalophyllodendron, Vaill., 410
Kamptzia, Nees., 366
Kandelia, W. & Arn., 291, 303
Kanilia, Bl., 303
Karwinskia, Zucc., 54, 76
Kayea, Wall., 409, 427
Kelleria, Endl., 113, 137
Kierschlegeria, Spach, 470
Kissosycea, Miq., 212
Kneiffia, Spach, 463
Kokoona, Thw., 4, 32
Kosaria, L., 200
Kunzea, Reichb., 318, 364
Kurrimia, Wall., 6, 39

Lacerdæa, Berg., 356
Lachara, L., 128
Lachnea, Roy., 108, 128
Lafoensia, Vandell., 437, 457
Lagerstrœmia, L., 435, 455
Lagetto, L., 131
Laguncularia, Gærtn. f., 267, 281
Lamarchea, Gaudich., 318, 362
Lamarckia, Endl., 33
Lamprophyllum, Miers, 410
Lanessania, H. Bn., 158, 210
Langsdorffia, Mart, 507, 515
Lanigerostemma, Chap., 385
Lasiadenia, Benth., 109, 129
Lasiodiscus, Hook. f., 61, 88
Laurenbergia, Berg., 481
Laureola, Spach, 134
Lauridia, Eckl. & Zeyh., 34
Lavauxia, Spach, 463
Lawsonia, L., 436, 456
Leandria, A. Gray, 309
Lecythis, Lœfl., 330, 379
Lecythopsis, Schr., 378
Legnotis, Sw., 306
Leiopyrena, Spach, 190
Leiosycea, Miq., 212
Leitneria, Chapm., 242, 261
Lepidobalanus, Endl., 233
Lepidopelma, Kl., 49

Leptospermum, Forst., 314, 360
Lepurandra, Nimm., 206
Leucocarpon, A. Rich., 36
Leuconocarpus, Spruce, 403
Leucosmia, Benth., 104
Lhotzkya, Schau., 325, 371
Limnopence, Vaill., 484
Linodendron, A. Gray, 130
Linostoma, Wall., 105, 125
Lipophyllum, Miers, 395
Lithocarpus, Bl., 233
Llavea, Liebm., 21
Lopezia, Cav., 474, 499
Lophopetalum, Wight, 3
Lophostemon, Schott., 364
Lophostoma, Meissn., 107, 126
Lophozonia, Turcz., 237
Lotopsis, Spach, 190
Loudonia, Lindl., 479, 500
Ludwigia, L., 465, 494
Ludwigiaria, DC., 466
Luma, A. Gray, 310
Lumnitzera, W., 266, 281
Lupulus, T., 165
Lyciopsis, Spach, 470
Lygia, Fasan., 135
Lysicarpus, F. Muell., 366
Lysimachia, Bauh., 447
Lysimachion, Tausch., 468
Lythrocuphea, Kœhne, 454
Lythrum, L., 429, 449

Macahanea, Aubl., 413
Macarisia, Dup.-Th., 293, 305
Macgregoria, F. Muell., 44
Macharisia, Endl., 293
Macklottia, Korth., 314
Maclellandia, Wight, 456
Maclura, Nutt., 147, 196
Macoubea, Aubl, 413
Macromyrtus, Miq., 357
Macrophthalma, Gasp., 212
Macropsidium, Bl., 309
Macropteranthes, F. Muell., 267, 282
Macrorhamnus, H. Bn., 54, 76
Macrostegia, Turcz., 138
Maillardia, Frapp., 146
Maiten, Feuill., 37
Malaisia, Blanco, 196
Mammea, Plum., 408, 426
Mangium, Rumph., 457
Mangle, Plukn., 287
Manglesia, Lindl., 363
Mangostana, Gærtn., 406
Maquira, Aubl., 157, 209
Marcorella, Neck., 53
Marialva, Vandell., 401
Marlea, Roxb., 273
Marleopsis, H. Bn., 273
Marlieria, Cambess., 311, 355
Maurocenia, Mill, 33
Maytenus, Feuill., 6, 37
Megadendron, Miers, 374
Megapterium, Spach, 464
Meionectes, R. Br., 479
Melaleuca, L., 362
Melanium, P. Br., 453
Melanocarya, Turcz., 3
Mevilla, Anders., 453
Menichea, Sonner., 326
Meriolix, Rafin., 464
Mesua, L., 409, 427
Meteorus, Lour., 326
Methyscophyllum, Eckl., 31
Metrosideros, Banks, 319, 365
Meyropeltis, Welw., 204
Mezereum, C. A. Mey., 133
Mezereum, Spach, 133
Micranthera, Chois., 401
Microjambosa, Bl., 357
Micromyrtus, Benth., 326, 373
Microptelea, Spach, 140
Microrhamnus, A. Gray, 58, 84
Microrhamnus, Maxim., 53
Microtropis, Wall., 4, 31
Middendorfia, Trautv., 440
Milleporum, Spach, 386
Milligania, Hook. f., 483
Misandra, Commers., 483
Misandropsis, Œrst., 483
Mitranthes, Berg., 355
Mitraria, Gmel., 326
Molinæa, Commers., 93
Mollia, Gmel., 361
Momisia, Dumort., 189
Momisiopsis, Bl., 189
Monetia, Lhér., 12
Monoxora, Wight, 354
Monteverdia, A. Rich., 37
Montinia, L. f., 469, 495
Montrouzeria, Panch., 404, 424
Mooria, Montrouz., 320, 366
Moronobea, Aubl., 403, 424
Mortonia, A. Gray, 7, 41
Morus, T., 144, 193
Moya, Griseb., 37
Mullofullon, Dios, 480
Münchhaussia, L., 455
Musanga, R. Br., 162, 217
Myginda, L., 34
Myrceugenia, Berg., 310
Myrcia, DC., 311, 353
Myrcianthes, Berg., 309
Myrciaria, Berg., 357
Myriandra, Spach. 386
Myrianthus, P. Beauv., 162, 217
Myrica, L., 244, 262
Myrinia, Lilj., 470
Myriopeltis, Welw., 204
Myriophyllon, Vaill., 480, 501
Myriophyllum, L., 480
Myrobalanus, Gærtn., 268, 283
Myrrhinium, Schott., 312, 356
Myrteola, Berg., 309
Myrtus, T., 308, 352
Mystropetalon, Harv., 505, 514
Mystroxylon, Eckl., 33

Nægelia, Zoll. & Mor., 59
Nagassarium, Rumph., 409
Nageia, Gærtn., 246
Naghas, Herm., 409
Nahusia, Schneev., 470
Nania, Miq., 365
Napoleona, P. Beauv., 331, 380
Naucleopsis, Miq., 157, 208
Nectandra, Berg., 127
Nectandra, Roxb., 105
Neerija, Roxb., 33
Neesia, Mart., 131
Nelitris, Gærtn., 353
Nematopyxis, Miq., 465
Nematostigma, Pl., 190
Nematosycea, Miq., 212
Neriophyllum, B. H., 364
Nesæa, Commers., 432, 450
Nesiota, Hook. f., 61, 87
Nimmoia, Wight, 440
Noltia, Reichb., 55, 78
Nordmannia, Fisch. & Mey., 130
Norysca, Spach, 386
Nothofagus, Bl., 237
Notophæna, Miers, 91
Noyera, Tréc., 157, 208
Nyssa, L., 269, 284

Ochetophila, Miers, 91
Ochrocarpus, Dup.-Th., 408, 426
Ocimastrum, Rupr., 473
Octolepis, Oliv., 105, 125
Œdematopus, Pl. & Tri., 399
Œnoplea, Hedw., 80
Œnothera, L., 461, 493
Ogcodeia, Bur., 209
Oligospora, Pl. & Tri., 399
Olinia, Thunb., 48
Olmedia, R. & Pav., 155, 206
Olympia, Spach, 388
Omphalanthera, Pl. & Tri., 396
Onagra, T., 461
Onosuris, Rafin., 486
Ophispermum, Lour., 102
Opisanthes, Lilj., 466
Oreophila, Nutt., 30
Oreoptelea, Spach, 142

Ortegioides, Soland., 442
Orthostemon, Berg., 354
Osbornia, F. Muell., 322, 368
Ostrya, Micheli, 229
Ostryopsis, Dcne., 227
Ovidia, Meissn., 112, 134
Oxycarpus, Lour., 406
Oxymyrrhine, Schau., 361
Oxystemon, Pl. & Tri., 395

Pachylophis, Spach, 463
Pachysandra, Michx., 19, 49
Pachysandria, Hook., 49
Pachystima, Rafin., 3, 30
Pachytrophe, Bur., 193
Paivæa, Berg., 355
Paletuviera, Dup.-Th., 303
Paliurus, T., 58, 83
Pamea, Aubl., 268, 283
Panke, Feuill., 483
Pankea, Œrst., 483
Papyrius, Poir., 195
Parartocarpus, H. Bn., 154, 204
Parasponia, Miq., 143, 191
Paratrophis, Bl., 146, 194
Parietaria, Leschen, 201
Parsonsia, P. Br., 453
Paryphantha, Schau., 373
Pasania, Miq., 233
Passerina, L., 113, 136
Pautsauvia, J., 273
Peddiea, Harv., 110, 132
Pellacalyx, Korth., 293, 305
Pelonastes, Hook. f., 480
Peltostigma, Pl. & Tri., 407
Pemphis, Forst., 437, 456
Penæa, L., 95, 100
Pentadesma, Sab., 404, 425
Pentagonaster, Kl., 364
Pentaptera, Roxb., 268, 284
Pentapteris, Hall, 480
Pentapterophyllum, Dill., 480
Peplis, L., 440
Perebea, Aubl., 157, 209
Pereskia, Velloz., 13
Pericalymna, Endl., 314
Peripterygia, H. Bn., 39
Perissus, Miers, 413
Perpensum, Burm., 483
Perrottetia, H. B. K., 6, 39
Petalocarpum, Dup.-Th., 35
Petaloma, DC., 291
Petaloma, Roxb., 281
Petalopogon, Reiss., 87
Petersia, Welw., 328, 375
Pevræa, Commers., 263
Phæostoma, Spach, 466
Phaleria, Jack, 104, 124
Pharmacosycea, Miq., 212
Phloianthera, Pl. & Tri., 396
Phylica, L., 60, 86
Phyllocalyx, Berg., 357
Phyllochlamys, Bur., 149, 199
Phyllothyrsus, Spach, 224
Phymatocarpus, F. Muell., 363
Physocalymma, Pohl., 437, 457
Physopodium, Desvx., 445
Pileanthus, Labill., 325, 371
Piliocalyx, Br. & Gr., 314, 358
Pilosperma, Pl. & Tri., 400, 422
Pimelea, Banks & Sol., 114, 138
Pimenta, Lindl., 310, 353
Pinastella, Dill., 484
Piptocelus, Turcz., 21
Piptochlamys, C. A. Mey., 135
Piratinera, Aubl., 160, 211
Pirigara, Aubl., 377
Pisaura, Bonat., 474
Plæsiantha, Hook. f., 305
Plagiostigma, Zucc., 212
Planchonia, Bl., 328, 374
Planera, Gmel., 142, 188
Platonia, Mart., 404, 425
Plecospermum, Tréc., 148, 197
Plenckia, Reiss., 7, 41
Pleurandra, Rafin., 486
Pleurocalyptus, Br. & Gr., 319, 365
Pleurophora, Don., 431, 449
Pleurostemon, Rafin., 486
Pleurostylia, W. & Arn., 5, 36
Plinia, L., 357
Plokiostigma, Schau., 8
Plutonia, Noronh., 104
Podosycea, Miq., 212
Pœciloneuron, Bedd., 410, 427
Pogonotrophe, Miq., 212
Poivrea, Commers., 263
Pokornya, Montrouz., 446
Polyacanthus, Presl., 36
Polycardia, J., 6, 38
Polygonum, Poir., 164
Polyphema, Lour., 151
Polythecandra, Pl. & Tri., 395
Polyzone, Endl., 370
Pomaderris, Labill., 61, 89
Pontoppidana, Scop., 378
Portenschlagia, Tratt., 33
Pourouma, Aubl., 161, 214
Prieurea, DC., 466
Primulopsis, Torr. & Gr., 463
Proserpinaca, L., 482, 501
Proteophyllum, Spach, 190
Pseudais, Dcne., 104
Pseudalangium, F. Muell., 273
Pseudocaryophyllus, Berg., 310
Pseudogunnera, Œrst., 483
Pseudolmedia, Tréc., 157, 207
Pseudomorus, Bur., 146, 194
Pseudosorocea, H. Bn., 161, 213
Pseudostreblus, Bur., 149, 198
Pseudotreculia, H. Bn., 204
Psidiopsis, Berg., 356
Psidium, L., 312, 356
Psilæa, Miq., 127
Psilosolena, Presl., 132
Psiloxylon, Dup.-Th., 439, 459
Psorophytum, Spach, 386
Psorospermum, Spach, 384, 392
Ptelidium, Dup.-Th., 5, 35
Pterocelastrus, Meissn., 6, 38
Pteromyrtus, H. Bn., 313, 357
Ptilophyllum, Nutt., 481
Ptolina, Nutt., 441
Punica, T., 333, 381
Purshia, Rafin., 480
Putterlickia, Endl., 5, 37
Pyrospermum, Miq., 39
Pyrranthus, Jack., 281

Quapoya, Aubl., 398, 421
Quartinia, Endl., 443
Quelusia, Vandell., 470
Quercinium, Ung., 250
Quercites, Ung., 250
Quercus, T., 230, 259
Quiina, Aubl., 411, 428
Quilamum, Blanco, 438
Quisqualis, L., 266, 280

Raddisia, Leandr., 47
Rademachia, Thunb., 151
Radojitskya, Turcz., 128
Ramatuella, H. B. K., 268, 283
Receveura, Velloz., 386
Regelia, Schau., 363
Reissekia, Endl., 60, 85
Renggeria, Meissn., 398
Rengifa, Pœpp., 398
Retamilia, Miers, 93
Retanilla, Ad. Br., 63, 99
Retinaria, Gærtn., 59
Retinostemon, Pl. & Tri., 396
Reynosia, Griseb., 84
Rhacoma, L., 5, 34
Rhamnella, Miq., 53
Rhamnidium, Reiss., 54, 75
Rhamnus, T., 52, 75
Rheedia, L., 408, 426
Rheediopsis, H. Bn., 407
Rhinostigma, Miq., 406
Rhizophora, L., 287, 302
Rhodamnia, Jack., 311, 354
Rhodomyrtus, DC., 310, 352
Rhyacophila, Hochst., 443, 460

Rhyma, Scop., 409
Rhytinandra, A. Gray, 273
Richiæia, Dup.-Th., 307
Riesenbachia, Presl., 476
Rima, Sonner., 151
Rinzia, Schau., 361
Robur, Spach, 233
Romualda, Tri., 13
Roscyna, Spach, 386
Rotala, L., 442
Roumea, Wall., 133
Rubachia, Berg., 355
Rubentia, Commers., 33
Rudbeckia, Adans., 284

Sagaretia, Ad. Br., 56, 80
Sahagunia, Liebm., 161, 214
Salacia, L., 15, 47
Salicaria, T., 429
Salisia, Lindl., 364
Salvadora, Garc., 12, 46
Sanamunda, Clus., 135
Sarcococca, Lindl., 19, 49
Sarcocolla, K., 97, 100
Sarcocordylis, Wall., 503
Sarcodiscus, Mart., 213
Sarcomphalus, P. Br., 55, 77
Sarcophyte, Sparm., 505, 514
Sarcynpia, H. Bn., 365
Sarothra, L., 386
Schæfferia, Jacq., 6, 37
Schidiomyrtus, Schau., 361
Schizocalyx, Berg., 313, 359
Schizocalyx, Hochst., 45
Schizocarya, Spach, 472
Schizomyrtus, H. Bn., 359
Schizopleura, Lindl., 363
Schœnobiblus, Mart., 114, 138
Scholtzia, Schau., 317, 361
Schousbœa, W., 263
Schrebera, Retz., 33
Schrebera, Thunb., 34
Schuermannia, F. Muell., 370
Schufia, Spach, 470
Schweiggera, Mart., 399
Sciadophila, Phil., 84
Scopolia, L. f., 133
Scutia, Commers., 57, 81
Scybalium, Harv., 505
Scypharia, Miers, 62
Scyphosyce, H. Bn., 159, 210
Scytophyllum, Eckl. & Zeyh. 37
Sellowia, Roth., 440
Senftenbergia, Kl. & Karst., 507
Seringia, Spreng., 35
Serpicula, L., 481, 501
Sheadendron, Bertol., 263
Shringata, Jones, 476
Sicelium, P. Br., 47
Simmondsia, Nutt., 19, 50
Singana, Aubl., 413
Siphoneugenia, Berg., 357
Siphonodon, Griff., 7, 40
Sitodium, Banks, 151
Skaphium, Miq., 105
Skinnera, Forst., 469
Sloetia, Teysm. & Binn., 151, 201
Smythea, Seem., 57, 82
Soala, Blanco., 413
Soaresia, Allem., 214
Solenostigma, Endl., 189
Sonneratia, L. f., 328, 376
Sorocea, A. S.-H., 161, 213
Soulangia, Ad. Br., 87
Spachia, Lilj., 470
Spallanzania, Neck., 377
Sparattosyce, Bur., 161, 213
Spermolepis, Br. & Gr., 366
Sphærandra, Pl. & Tri., 396
Sphærostigma, Ser., 464
Sphalanthus, Jack., 280
Sphenocarpus, Rich., 281
Sphondylastrum, Torr., 481
Sphondylophyllum, Torr., 480
Sponia, Commers., 190
Sponioceltis, Pl., 190
Spyridium, Fenzl., 61, 89
Stackhousia, Sm., 8, 43
Stalagmites, Murr., 405
Stauroclusia, Pl. & Tri., 396
Stelechospermum, Bl., 413
Stellera, Gærtn., 135
Stellera, Gmel., 112, 135
Stenanthemum, Reiss., 62, 90
Stenocalyx, Berg., 357
Stenochasma, Miq., 218
Stenodiscus, Reiss., 89
Stenosiphon, Spach, 472
Stephanodaphne, H. Bn., 107, 126
Stravadia, Pers., 326
Stravadium, J., 326
Streblus, Lour., 149, 198
Stromadendrum, Pav., 195
Strongylocalyx, Bl., 358
Struthia, Roy., 127
Struthiola, L., 113, 137
Stylapterus, A. Juss., 97
Stylidium, Lour., 273
Stylis, Poir., 273
Styloceras, A. Juss., 19, 50
Suber, Spach, 233
Suber, T., 230
Suffrenia, Bell, 442
Sychinium, Desvx., 200
Sycocarpa, Miq., 212
Sycomorphe, Miq., 212
Sycomorus, Gasp., 212
Syllysium, Mey. & Schau., 357
Symmetria, Bl., 291, 445
Symphonia, L. f., 402, 424
Symphyomyrtus, Schau., 320, 367
Synædris, Lindl., 230
Synaptolepis, Oliv., 107, 126
Syncarpia, Ten., 319, 365, 366
Synœcia, Miq., 212
Syzygium, Gærtn., 313, 357

Talguenea, Miers, 63, 93
Tanibouca, Aubl., 284
Taraxia, Nutt., 464
Taxandria, Benth., 360
Taxotrophis, Bl., 149, 198
Taxotrophis, F. Muell., 194
Teichmeyera, Scop., 377
Temu, Berg., 309
Temus, Mol., 309
Tenorea, Gasp., 212
Tepualia, Griseb., 319, 365
Terminalia, L., 267, 283
Terpnophyllum, Thw., 407
Tetracrypta, Gardn., 296
Tetradia, Dup.-Th., 454
Tetrapasma, Don., 91
Tetrapora, Schau., 361
Tetrastemon, Hook. & Arn., 356
Tetrataxis, Hook. f., 435, 454
Theaphyllum, Nutt., 39
Thecanthes, Wikstr., 138
Thilco, Feuill., 470
Thiloa, Eichl., 265
Thönningia, Vahl., 508, 516
Thryptomene, Endl., 326, 373
Thymelæa, T., 112, 135
Thymelina, Hoffmsg., 127
Thymopsis, Spach, 388
Tindaparua, Rheed., 198
Tita, Scop., 306
Tolypeuma, E. Mey., 450
Tombea, Br. & Gr., 376
Tomex, Forsk., 45
Tomostylis, Montrouz., 445
Tonsella, Schreb., 47
Tontelea, Aubl., 47
Tovomita, Aubl., 401, 423
Tovomitopsis, Pl. & Tri., 401
Toxylon, Rafin., 196
Trachycarpus, Pl. & Tri., 401
Trapa, L., 476, 499
Treculia, Dcne., 154, 204
Trema, Lour., 143, 190
Trematosycea, Miq., 212
Trevoa, Miers, 63, 94
Triadenia, Spach, 386
Tribuloides, T., 476
Tricera, Sw., 19
Trichocephalus, Ad. Br., 87
Tridesmis, Spach, 385
Tridia, Korth., 386
Trigonocarpus, Wall., 32

Trigonotheca, Hochst., 31
Triplandron, Benth., 396
Tripterococcus, Endl., 8
Tripterygium, Hook. f., 7, 41
Tristania, R. Br., 318, 364
Tristaniopsis, Br. & Gr., 364
Tritheca, W. & Arn., 440
Trixis, Mitch., 482
Trophis, P. Br., 146, 195
Trophis, Retz., 198
Trymalium, Fenzl., 61, 88
Trymatococcus, Pœpp., 202
Tubanthera, Commers., 78
Tubo-Avellana, Spach, 227
Tupelo, Catesb., 269
Tylanthus, Reiss., 87

Ugni, Turcz., 309
Ulmus, T., 140, 187
Uromorus, Bur., 194
Urostigma, Gasp., 212
Urtica, Thunb., 201

Velaga, Gærtn., 455
Ventilago, Gærtn., 57, 82
Verticillaria, R. & Pav., 426
Verticordia, DC., 324, 371
Vicentia, Allem., 284
Vigiera, Velloz., 466
Visiania, Gasp., 212
Vismia, Vandell., 382, 392
Vittmannia, W. & Arn., 78
Vyenomus, Presl., 1

Walpersia, Reiss., 87
Webbia, Spach, 388
Weihea, Spreng., 295, 307
Wichurea, Nees., 90
Wikstrœmia, Endl., 112, 134
Willemetia, Ad. Br., 78
Wimmeria, Schlchtl., 6, 38
Winterlia, Spreng., 440
Woodfordia, Salisb., 433, 452

Xanthe, Schreb., 396
Xanthochymus, Roxb., 405
Xanthostemon, F. Muell., 319, 365
Xylopleurum, Spach, 463

Zauschneria, Presl., 467, 494
Zelkova, Spach, 142, 188
Zinowiewia, Turcz., 5, 35
Zizyphus, T., 58, 83
Zugygium, P. Br., 355

END OF VOL. VI.

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